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MZP & MZP E Series

Paging & Program Distribution Systems

For use with MZP Designer Software version 3.4.99 or greater

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User Manual

Introduction

Congratulations on your purchase of the Intelix MZP Paging & Program Distribution System.

This manual covers all aspects of the design, use, installation, and programming of the Intelix MZP system. Because the MZP is a unique combination of hardware and software, Intelix strongly advises installation only after the thorough reading of this manual. Customer support is available through Intelix if you encounter any problems.

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1.0 System Overview

Each Intelix Multi-zone Paging and Program Distribution System (MZP)combines a matrix mixer and a variety of remote control devices which can be combined to produce custom-tailored paging and/or program (background music) selection and volume control stations. The stations are connected to the matrix via a custom serial data bus (the ReO bus); however, the MZP system can also be controlled via RS232. A complete list of the MZP RS232 protocol can be obtained from www.intelix.com.

The hardware components of the MZP (audio inputs, outputs, zones, and Comet remote stations) are configured and programmed using supplied MZP Designer Setup and Control Software. In the proramming mode, the desired number of audio sources, destinations, paging stations, and program selector locations may be entered. Paging levels, routing, remote control personalities, duck level during page, and any other parameters of the system are defined using drop-down lists and descriptive terminology. Once the design phase is complete, the designer file may be downloaded to the system hardware and the system will operate according to specifications. Changing system functions and altering the existing system is possible using the Intelix Designer Software.

1.1 Matrix Mixer Overview

At the heart of the MZP Matrix Mixer is the **application CPU**, which routes data and contains the software controlling the device. The application CPU also contains several "device-level" pieces of information and is responsible for RS232 communication. As shown in Fig. 1a, the application CPU off-loads many real-time tasks to other CPUs. These multiple CPUs are tightly coupled to provide real time processing and fast response time.

The audio crosspoint CPUs route and mix the audio signals from audio inputs and outputs. Because these functions are distributed among several processors, it is possible to perform complex tasks such as independent crosspoint ramping, slewing, and implementing nonlinear response curves. Such tasks are used by the application CPU to implement higher-level functions such as show control, multi-zone paging, and room combining.

The ReO devices are the user I/O interfaces. The ReO bus has its own CPU (the "Communication CPU") which constantly polls the remotes on the bus and reports to the application CPU. The remote devices are logically grouped together into "stations" to provide flexible, coordinated control locations for paging, audio source selection, and volume control.

The matrix mixer contains an optional PCMCIA card capable of carrying 8 binary inputs and 8 binary outputs. This I/O is generic so that the matrix mixer can interact with custom panels or other pieces of equipment.

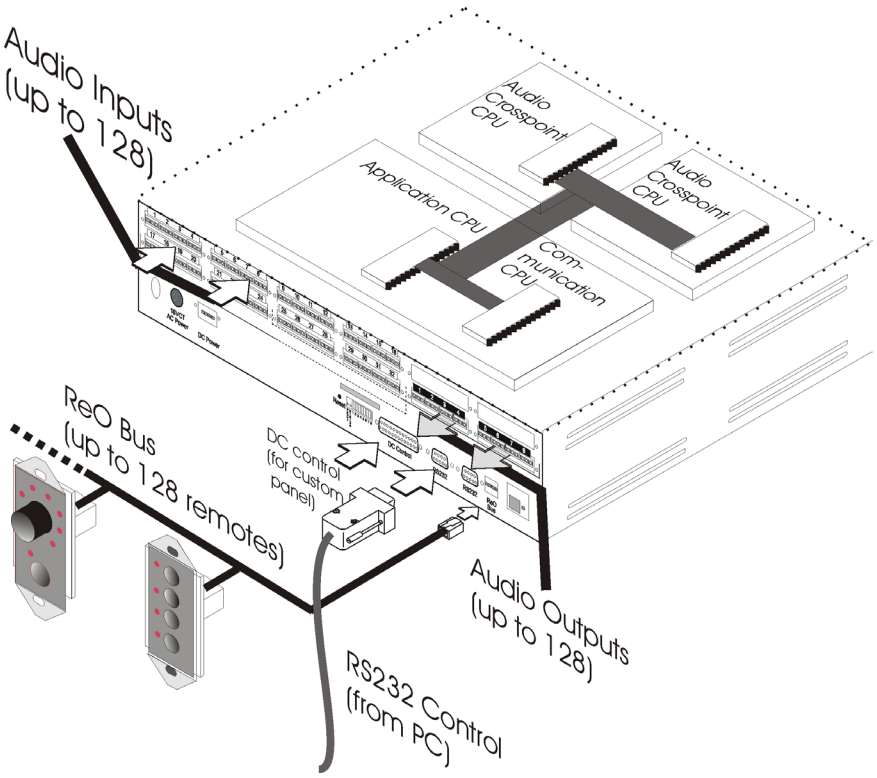


Fig. 1a Matrix System Diagram

The audio matrix is the heart of the MZP and is used to route and mix audio signals from multiple sources to multiple destinations. The audio matrix is designed so that *audio inputs can be independently mixed to all outputs simultaneously.*

Each "row" of the matrix represents an individual audio input, whereas each "column" of the matrix represents an individual audio output. As shown in Fig. 1b, a voltage controlled attenuator (VCA) is at every crosspoint and "virtual" VCAs on each input and output, thus allowing maximum control and flexibility.

Following are more detailed drawings of individual crosspoints, showing the parameters available for controlling each crosspoint.

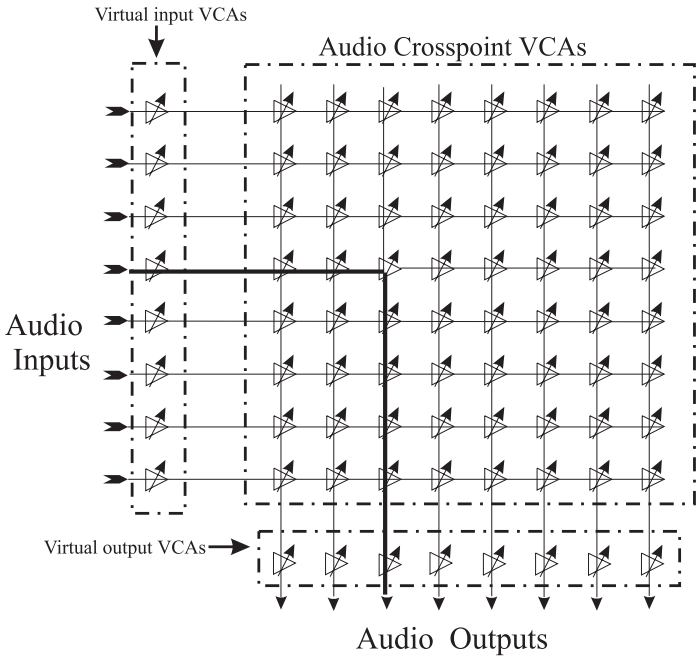


Fig. 1b 8x8 Matrix Crosspoint Example

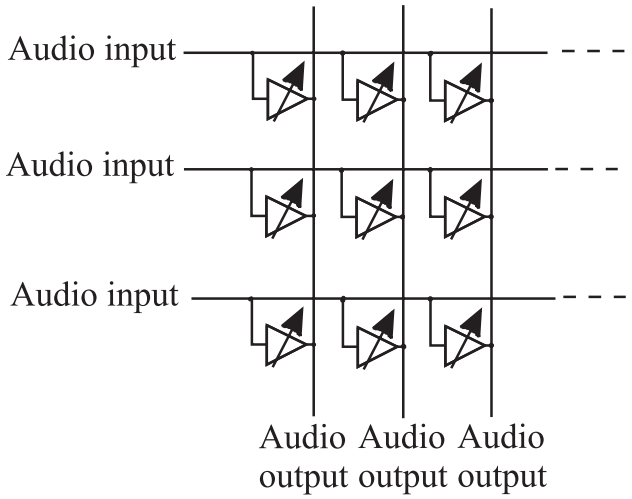


Fig. 1c Actual Matrix Wiring

Fig. 1c shows how the matrix is actually wired. Each input and output is independent of each crosspoint; i.e., a crosspoint affects only a single input/output pair.

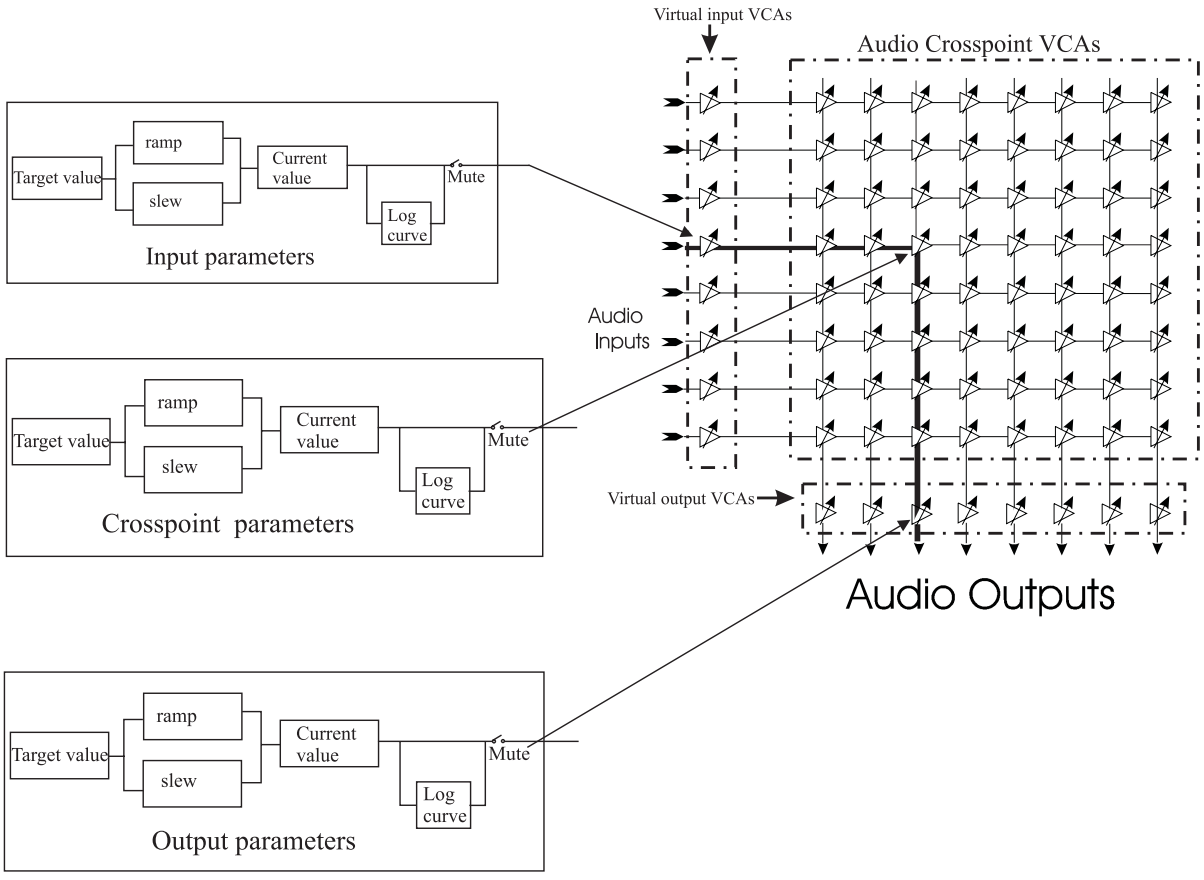


Fig. 1d Typical Audio Signal Path

Fig. 1d shows the a typical audio signal path (input 4 to output 3), as well as the parameters that control each crosspoint in the matrix mixer's grid of crosspoints. Note that each crosspoint has multiple controlling parameters.

1.2 ReO Remote Overview

Intelix Comet Series Remotes are single gang “decora” control modules for the Intelix MZP system. Wall-mounted, Comet remotes typically function as convenient user interfaces for paging, program source selection, and volume control.

A carefully optimized design allows the Comet remote controls to conveniently interconnect in a LAN bus topology. Up to 128 remotes can be utilized with one MZP matrix mixer via ReO bus communication. Each remote’s “personality” is then easily assigned using the MZP Designer Software. This “personality” can easily be reassigned as applications change.

1.2.1 Comet remote descriptions

Comet Tail: The Comet Tail is a digital remote control device designed for volume control and mute functions.

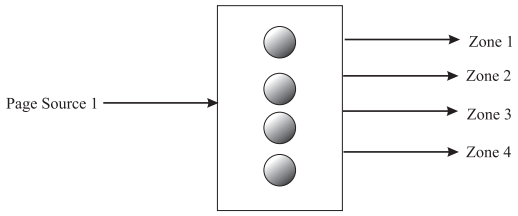
Comet-4: The Comet-4 is a four button digital remote control device designed for source selection or page routing functions.

Comet-0 I/O: The Comet-0 is a version of the Comet-4 remote control that has no buttons or LEDs. This device is used when external contact closures or 5V logic signals are used to trigger a source selection or page routing function. There are four 5V output drivers for triggering external devices.

1.2.2 Station overview

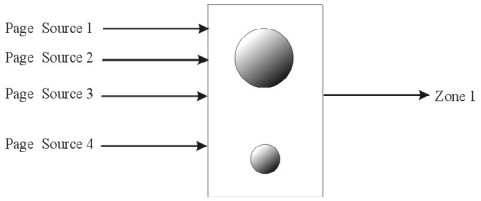
A station is a logical grouping of Comet remotes (Comet-4s and/or Comet Tails) which control the routing and volume of audio inputs into output zones. There can be up to 32 remotes in a single station, and up to 128 stations in a single system (each MZP is limited to 128 total remotes per system). The remotes are described in detail in Appendix D.

Paging Station



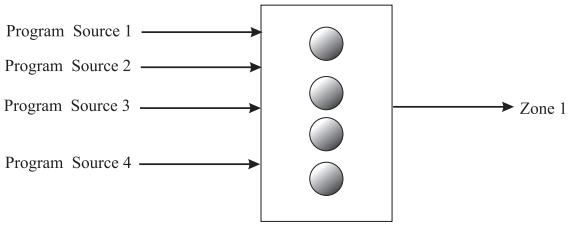
A paging station routes a single paging input (such as a paging microphone) to any of several zones. It is typically located at a receptionist's or secretary's desk. Zones are selected by remote buttons in the paging station. If a zone is already receiving a page when selected, that zone's LED will flash. A paging station can optionally contain a Comet Tail to control the level of all outgoing pages.

Page Volume Station



A page volume station controls the volume of all pages into a single zone. The station is located in the zone whose page volume is to be controlled. Using this type of station, different zones can have a page volume station to set a level of page volume appropriate to their ambient noise level.

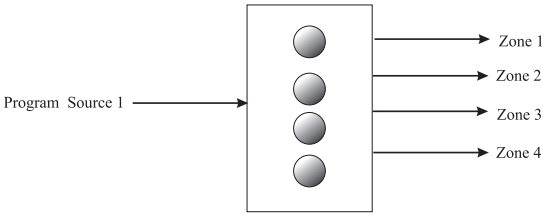
Program Select Station



A program select station routes multiple program sources (CDs, tuners, tapes etc.) into a single zone. The station is located in the zone and contains a Comet-4 button for every program source needed by that zone. It can also contain a Comet Tail for program volume control.

There are two types of program select stations: a selector and a mixer. The selector selects just one program source at a time. A mixer, on the other hand, mixes all selected program sources together; i.e., each button latches on its program source until that button is pressed again.

Program Distribution Station



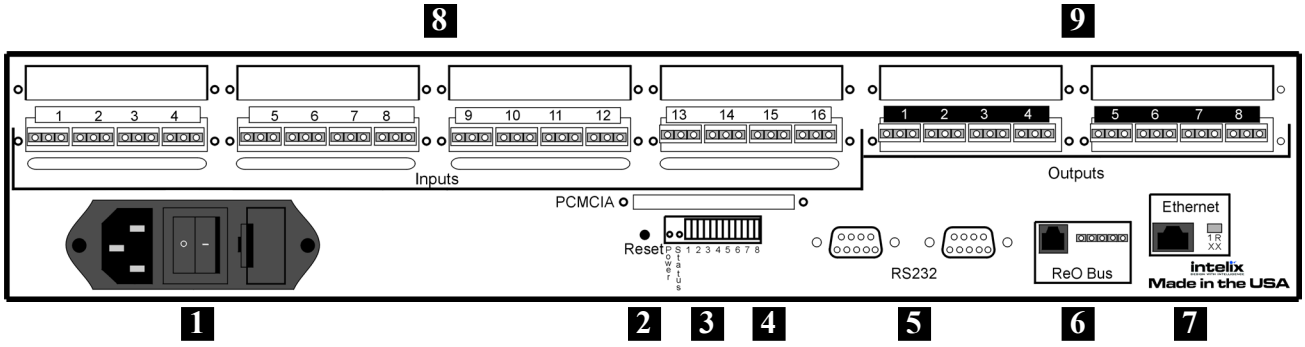
A program distribution station routes a single program input to many output zones. It is typically mounted in the control room with the MZP and is not accessible to the users. This type of station can reduce hardware cost and complexity, as well as increase security in certain designs. The MZP automatically keeps the multiple controls on that input in sync so that the LEDs on a Comet-4 and the bar graph of a Comet Tail always reflect the same information.

1.3 Matrix Mixer Panels

1.3.1 Matrix front panel

There is one red LED on the front panel. When lit, this LED indicates power to the matrix. The MZPE also contains a second, front panel COM port (port #2) for hassle-free monitoring and diagnostics.

1.3.2 Matrix rear panel



1 **IDE Power Module** - Power status is indicated by the red LED on the front panel. This is the only means of powering down the matrix.

2 **Reset button** - Restarts matrix microprocessors, but does not reset program information.

3 **PCMCIA Card Slot** - Slot for optional Logic Input/Output PCMCIA card featuring 8 logic I/O port pins.

4 **LED/DIP switch position**:
Red LED- when lit, indicates the matrix CPU is powered.
Green LED- function depends upon settings made in software.
DIP switches- "up" position indicates the "on" condition "down" position indicates the "off" condition.

5 **RS232** - DB9, 9-pin (female) receptacle through which the matrix is linked to computer (PC) and other RS232 devices.

6 **ReO Bus** - 6-wire, modular jack receptacle, similar to RJ11 or RJ12, through which the matrix is linked to the ReO remote unit(s). The communication link is synchronous and serial. (2 ground wires, 2 clock wires, 2 data wires). The wiring connections to all the remote units are direct pin to pin. Any new connection **must** have the same pin order to be functional. (See section 12.1.2)

7 **Ethernet Port** - Ethernet port for TCP/IP LAN and Internet connectivity.

8 **Audio Inputs** and **Audio Outputs** - Strips of screw-terminal ("Phoenix-type") plug receptacles (male). Each
9 block accommodates four triplet plugs.

2.0 Quick Start

This section explains two major concepts: how to physically install the MZP system and how to program the required application.

The **Hardware Installation** section takes you from the installation of the MZP hardware components through an audio test of the completed hardware installation. It assumes the job site has been completely and correctly wired.

The **Application Creation** section details how MZP hardware and Designer software is used to program and test an application. It assumes that an application has been designed and documented. For design and application ideas, please visit the Application Notes directory in Intelix's online Technical Library (www.intelix.com/library.html).

Fig. 2a shows the basic components and interconnections of an MZP system. Shown is a mixture of Intelix supplied and contractor supplied components: Intelix supplies the MZP matrix mixer, the Comet remotes, PC software and, optionally, the ReO bus power supply and microphone preamps. The contractor must supply microphones, program sources, external amplifiers, speakers, and a PC for setup.

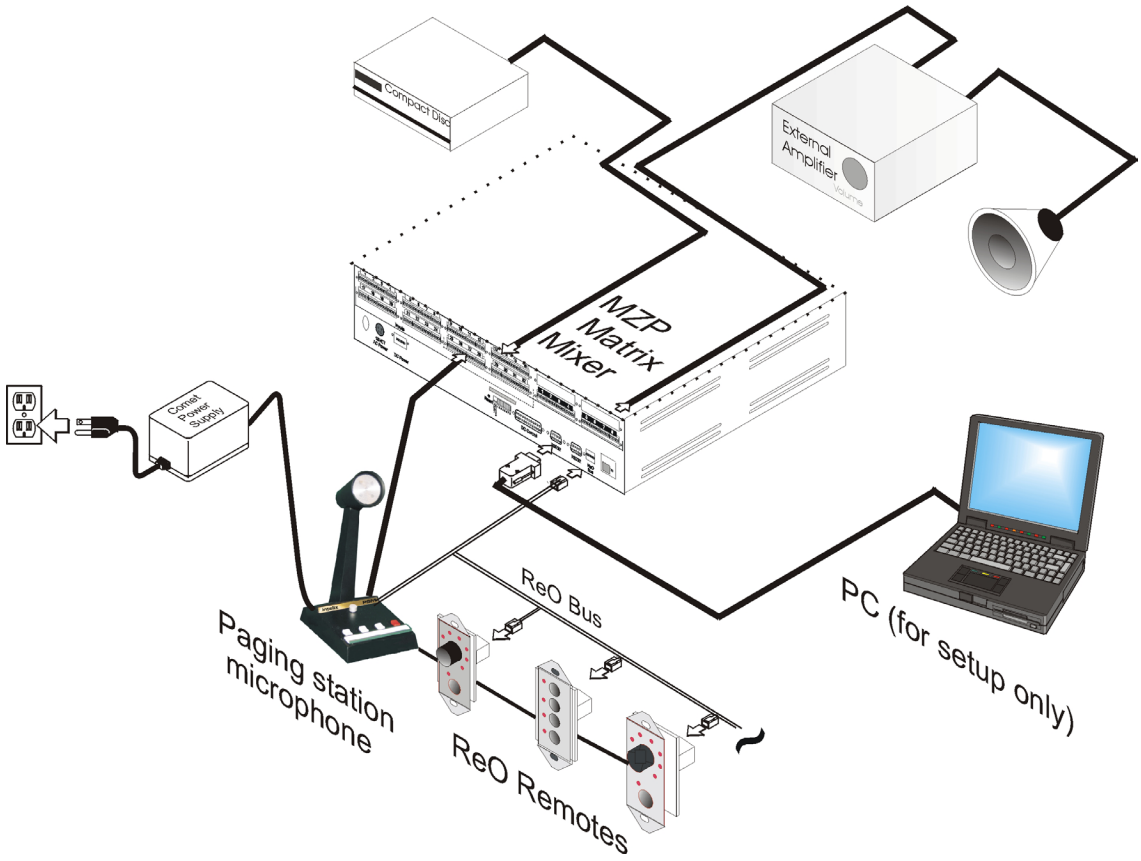


Fig. 2a Basic Components and Interconnections in an MZP System

2.1 Hardware Installation

The physical installation section guides from the beginning of the matrix mixer and ReO remote controls installation through an audio test of the installed system. It is assumed the job site is wired at this point; i.e., all wiring for audio and the ReO bus is complete. If the building is *not* wired, see the section 4.0. **You will follow these steps:**

2.1.1 Mount and power the MZP matrix mixer in the rack

There should be at least 1-2" of free air space at the sides of the matrix mixer for proper ventilation. Do not install directly above a power amplifier or other significant heat source. If you have unusual grounding requirements, see Appendix A. Ensure the ReO bus is ***not*** plugged into the matrix mixer.

2.1.2 Connect audio sources and outputs

All audio sources and outputs should be connected to the matrix mixer via the (removable) Phoenix connectors on the rear panel. Recommended input connection methods are shown in section 3.4.

2.1.3 Install remote controls in their assigned locations on the ReO bus

The locations for the remotes should be a part of the design documentation. Install each remote in its correct position. Plug in the ReO power connection and verify that the LED single blinks at a rate of about once per two seconds, then plug the ReO bus connection (the RJ12 plug) into each remote. ***The ReO bus should not be connected to the matrix mixer.***

2.2 Application Creation

This section guides from the end of the physical installation section through a final test and balance of the end user's system.

2.2.1 Connect the control PC to the MZP matrix mixer

Connect a DB9 cable between your PC serial port and the female DB9 receptacle on the matrix mixer (labelled "RS232"). The cable should be a straight through configuration.

2.2.2 Install and start MZP Designer Software on the controller PC

See section 5 for program installation.

2.2.3 Define the system

Use MZP Designer software to define audio inputs, outputs, zones, and ReO remote stations. For details, see section 6.

2.2.4 Set the ReO bus to Discovery Mode

Use the Assign Screen in MZP Designer Software to set the ReO bus to Discover Mode.

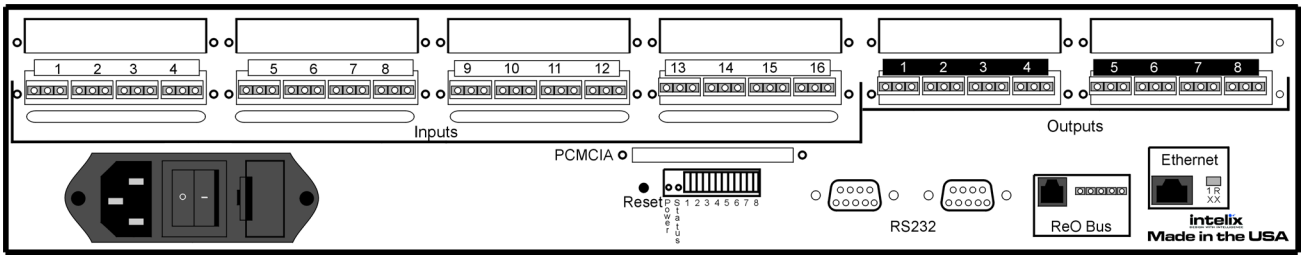


Fig. 2b Matrix Rear Panel

2.2.5 Connect the ReO bus to the MZP matrix mixer

Connect the ReO bus to the matrix mixer by connecting the RJ12 connector on the ReO bus into the RJ12 receptacle on the back of the matrix mixer, as shown in the rear panel drawing in Fig. 2b.

2.2.6 Perform remote recognition

Since your remotes have already been programmed, you may now put the matrix in "Run" mode and begin testing the system. If you are using Discovery Mode for remote recognition, see *Activating Remotes* in section 8.

2.2.7Define and program the remotes

Programming of the remotes is done through the MZP software and is guided by the definition of remote functions in your design.

2.2.8 Test and adjust the system

To perform a system test, you will need to have connected and turned on all audio sources. Also, the MZP matrix mixer *must be in Run mode*. Testing is be done by exercising each remote and listening to verify correct operation.

3.0 Matrix Wiring Details

3.1 Mounting the MZP in the Rack

The MZP matrix mixer mounts into a standard width rack. The number of rack spaces required depends on the number of inputs and outputs in your particular matrix mixer (standard configurations are 2RU).

Because the MZP generates heat, it is important to meet the following ventilating requirements.

1) Make sure there is at least 2 inches of free air space on both sides of the matrix mixer. Because the MZP's ventilation slots are on the side of the chassis, a free air column is required for proper ventilation.

2) All matrix mixers larger than 8 outputs are equipped with a front-mounted fan, which must remain unobstructed. Ensure there are no closeable doors on the rack that might seal the fan from a steady supply of fresh air.

3) Intelix recommends you not mount the matrix mixer next to a power amplifier or any other source of significant heat. Please leave an empty rack space above and below the matrix mixer.

3.2 Connect the Power Supply **(only for use on units requiring a power supply)**

1) Plug the power DIN connector into the back of the matrix mixer as shown in Fig. 3a.
2) Plug the power supply into a standard 120 VAC outlet.
3) The power LED on the front of the matrix mixer should now be lit.

There is no power switch on the matrix mixer. For information on grounding the matrix mixer, see Appendix A.

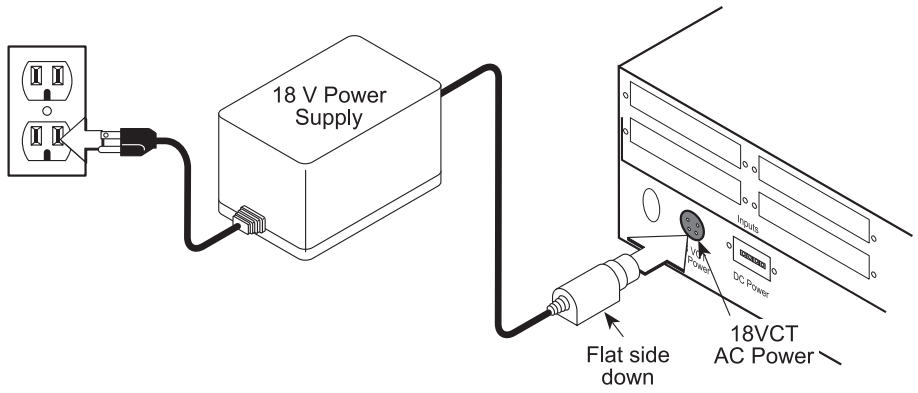


Fig. 3a DIN Connector Connection

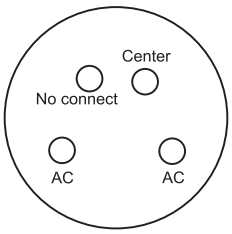


Fig. 3b 4-pin DIN Connector, viewed from the rear of the Matrix.

Intelix supplies an 18 Volt, 3.0 Amp center-tapped transformer for powering the mixer. Large matrix mixers may require a larger power supply. If a different AC supply is used, it should be of equal voltage and have at minimum a 60 Volt-Amp rating. The details of the **AC Power Jack** on the rear panel are shown in Fig. 3b.

3.3 Connecting Audio Inputs and Outputs

3.3.1 Audio inputs

Any line-level audio input can be routed and mixed using the MZP. The inputs are connected to the matrix via removable screw-terminal ("Phoenix-type") plug receptacles. The matrix's audio input can be either electronically balanced (impedance of 20 KΩ) or unbalance to 10 KΩ. The correct method of unbalancing the input is to "float" it; i.e., leave the unused pin open, as shown below.

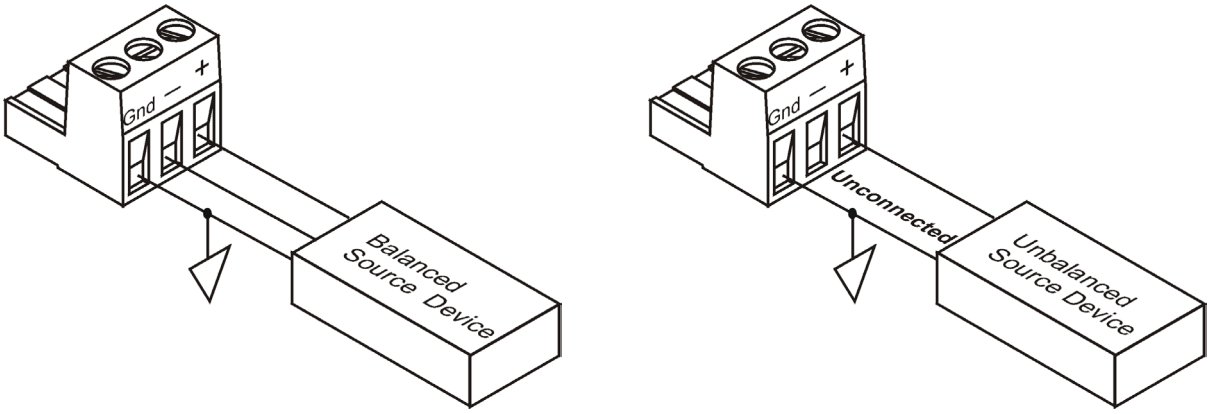


Fig. 3c These drawings show how balanced and unbalanced inputs should be connected to the matrix audio inputs.

3.3.2 Audio outputs

Audio output devices are connected to the matrix via removable screw-terminal ("Phoenix-type") plug receptacles. The audio output from the matrix is electronically balanced (impedance of 440 Ω), but it can be unbalanced (impedance of 220 Ω) by the user. The output can be correctly unbalanced by tying the negative leg to ground, as shown in Fig. 3d.

The matrix will give a 6 dB boost (which compensates for the signal-level loss due to unbalancing) to a signal unbalanced in this way. *Therefore, this method of unbalancing is preferable to floating one side of the pair of leads to unbalance it.*

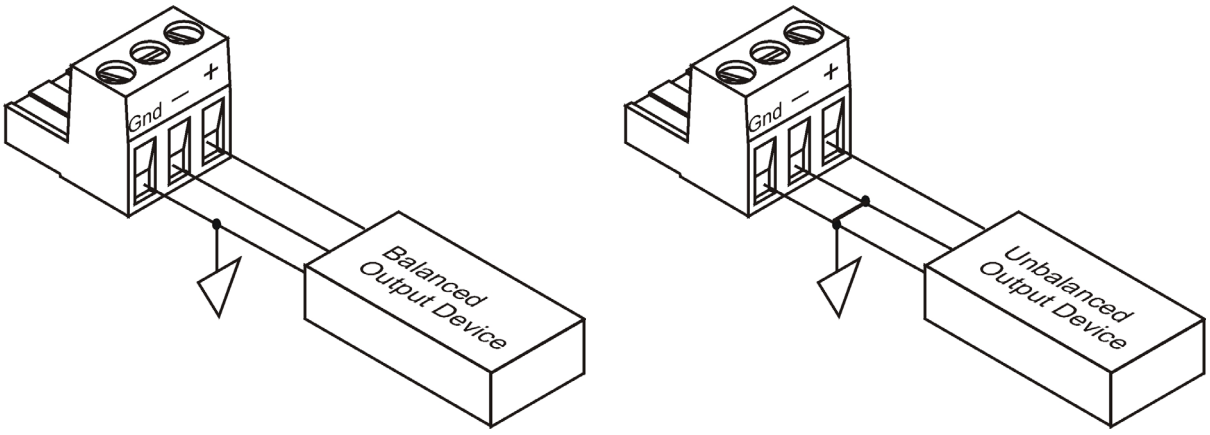


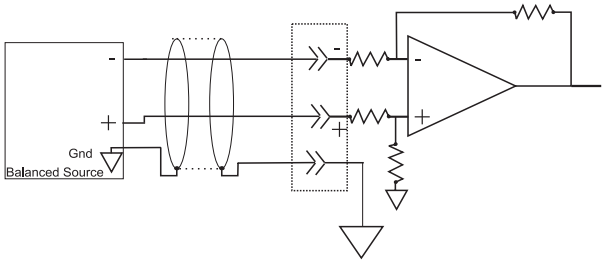
Fig. 3d Matrix output connections for balanced and unbalanced output devices.

3.4 Recommended Input Wiring Methods

The following are the recommended methods for connecting sources to the Intelix MZP. The mixer input is always balanced. From the following drawings, choose the wiring method for your input device (either balanced or unbalanced).

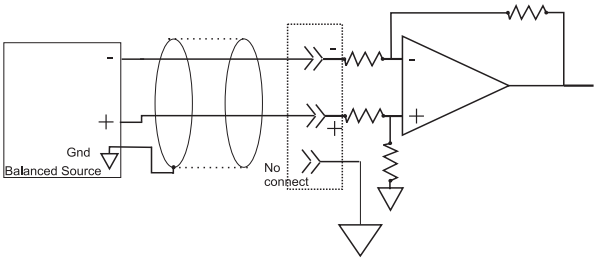
Balanced Source to Balanced Input - normal

Shown below is the normal wiring method for a balanced source device. It has +6 dB gain and excellent ground current and noise rejection.



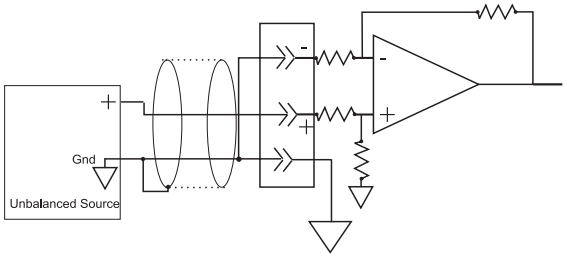
Balanced Source to Balanced Input - method 2

If the method above does not work in your application, use the wiring shown below. This method solves certain ground loop problems, having +6 dB gain and good noise and ground loop rejection.



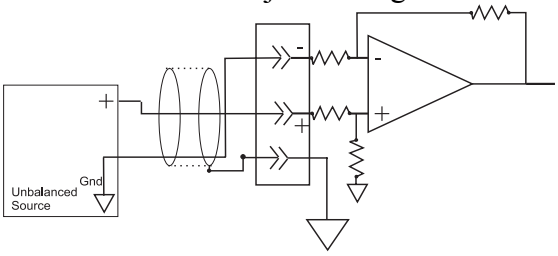
Unbalanced Source to Balanced Input - method 1

For an unbalanced source device, the drawing below shows the best wiring method. This wiring provides a slight (+6 dB) boost, as well as moderate noise and ground loop rejection.



Unbalanced Source to Balanced Input -method 2

For an unbalanced source device, the drawing below shows an alternative wiring method. Because the grounding of the minus input is not to the mixer ground, this method does not provide the +6 dB boost. Ground current and noise rejection is good.



3.5 Connecting the Control PC to the MZP

Before you can program your MZP matrix mixer, you need a personal computer desktop or laptop) capable of running the MZP Designer Software. Although other platforms are supported, Intelix recommends a computer running Windows 2000 or later. Your computer must meet these requirements:

√ PC computer (Pentium 266MHz and 64M RAM or better) with a CD-ROM drive
√ Windows® 2000 or later
√ Serial port connected to RS232 connector (either COM1 or COM2) on the matrix

The wiring diagram for an RS232 cable is at the bottom of the page. The drawing you use will depend on the connector on your PC. Most PCs have either a DB9 or a DB25 on the serial port. The cable wiring for both connectors are shown.

The matrix has two completely independent RS232 serial ports, called COM1 and COM2. Two comm ports enable the user to simultaneously connected both a dedicated controller and a PC running the Intelix software (or any two RS232 devices). There is no restriction on which port is used for any device. Additionally COM2 is mirrored to a third DB9 connector on the front panel for convenience in connecting to a racked matrix. *Only one device can be connected to COM2 at one time.* COM1 and COM2 baud rates are set independently with the rear panel DIP switches. As shown in Fig. 3e, you can also connect your PC directly to the MZP Ethernet port, using a 100baseT crossover cable. If you do this a static IP address is required.

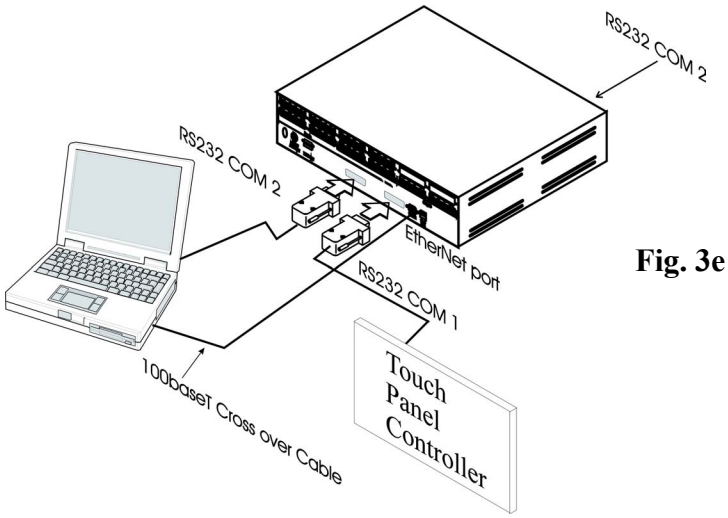


Fig. 3e PC directly to Matrix

All RS232 Cables are *straight-through* cables. *Using a null modem cable will cause communication failure!*

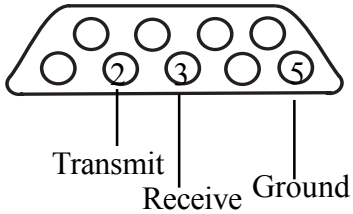


Fig. 3f The connections of the MZP's three DB9 connectors for RS232 COM ports 1 and 2 (front and rear).

3.6 DIP Switches

There are eight DIP switches on the rear panel of the matrix (see drawing below). For all DIP switches, the "up" position indicates the "on" condition, and the "down" position the "off" condition. The function of these switches is shown in Fig. 3g.

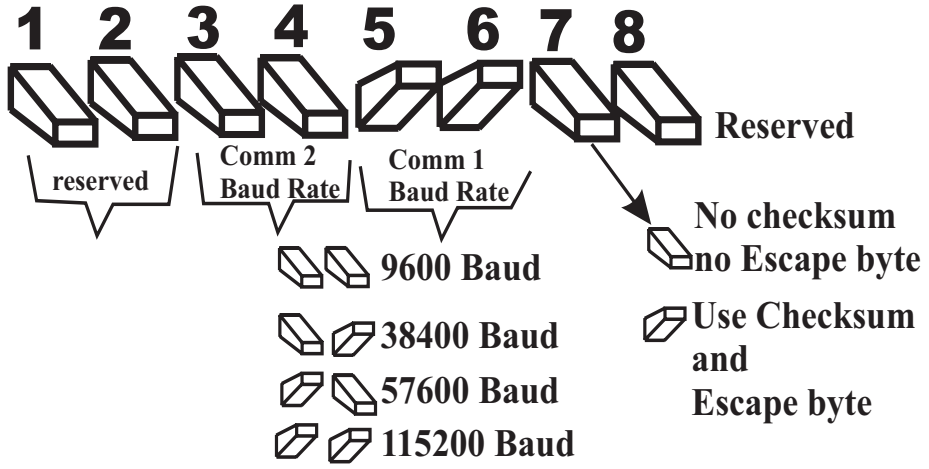


Fig. 3d **MZP Dip Switches**

DIP switches 1,2, and 8 are reserved for use by Intelix.

3.6.1 Baud rate selection

Not all baud rates are available to all revision of the MZP matrices. New matrices support more baud rates than older ones. The baud rates of 9600 baud and 38400 baud are common to both hardware sets.

To distinguish whether you have an old or new hardware, look at the rear panel if there are two DB9 connectors you have new hardware. If there is only one DB9, you have older style hardware. *If you cannot tell which type of hardware you have, use 9600 baud as a default, since all hardware support that rate.*

New Hardware baud Rates

The new hardware supports four baud rates: 9600, 38400, 57600, and 115200.

Old Baud Rates

Older hardware supports only three baud rates: 9600, 19200, and 38400.

Port 2 Baud Rates

DIP switches 3 and 4 set the RS232 baud rate of RS232 port COM 2. *Ports 1 and 2 can have different baud rates if desired.*

Port 1 Baud Rates

DIP switches 5 and 6 set the RS232 baud rate of RS232 port COM 1. *Ports 1 and 2 can have different baud rates if desired.*

DIP switch 7 allows the RS232 checksum and "escape" byte to be toggled on or off. These should be turned *off* in installations which include a permanent RS232 controller, such as AMX, Crestron or custom PC program. The RS232 checksum and escape byte should be turned *on* in installations where the RS232 communication may be hindered because of cable length (greater than 50 feet) or lack of shielding from external electronic noise.

3.7 Ethernet Connection

The Intelix matrix provides an RJ45 Ethernet connector on the rear panel. To connect the matrix to an Ethernet LAN, connect a cable with two RJ45 connectors to the matrix on one end and to the local LAN on the other. Now follow the direction for configuring TCP/IP communication in **section 7.6.3.** To connect a PC directly to the MZP Ethernet port, use a crossover RJ45 cable made of Cat 5.

4.0 ReO Bus and Comet Remote Wiring Details

This section covers the wiring of Comet remote devices, including data (ReO bus) and power to the remotes. Data and power should be wired with separate cabling to avoid interference.

There are two types of wiring for each comet: ReO bus data and ReO bus power.

4.1 Installation of the ReO Bus

4.1.1 Wire type

Category 5 (10 Megabits/sec) or better.

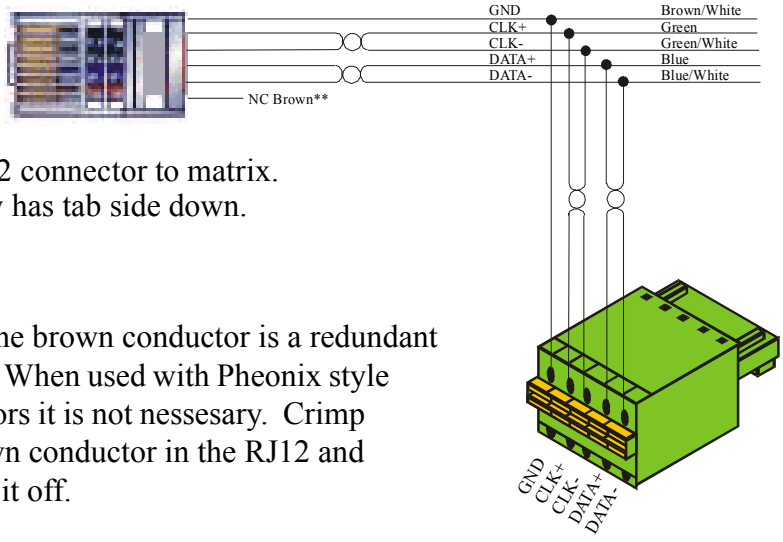
ReO Bus Data- this is the data bus for all remote devices, which are serially connected to the matrix ReO port.

ReO Bus Power- ReO bus devices are powered by 9-18V AC or DC.

4.1.2 Connections

Typically, three or four separate cables are used for daisy chaining. One cable will be the *Feed* from the matrix, two or three cables will be *Pigtails* connecting the remotes, and the last cable will be the *Send* to the next wall box.

1) Create a five inch pigtail of Cat 5 with about 1/4 inch stripped on both ends.
2) Insert the stripped ends of the pigtail into the Phoenix data port of the Comet remote. Repeat for each remote.
3) Twist and crimp the Feed, Pigtails, and Send wires together. Dolphin Crimp Connectors are recommended. MCM Part# 95-670
4) Continue this procedure until all the Comet remotes are connected.



RJ-12 connector to matrix.
View has tab side down.

Note: The brown conductor is a redundant ground. When used with Pheonix style connectors it is not nessesary. Crimp the brown conductor in the RJ12 and then cut it off.

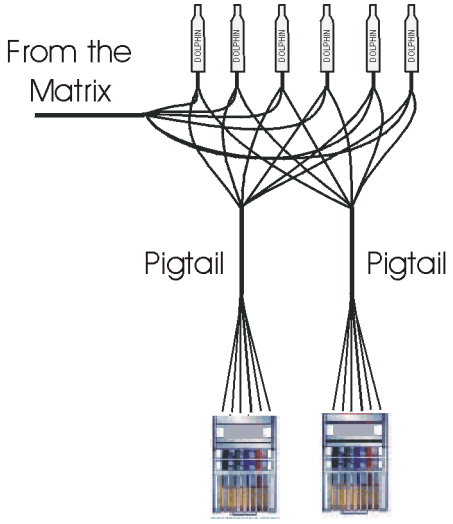
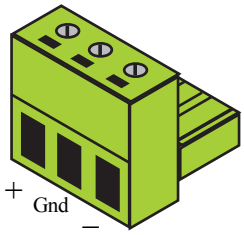
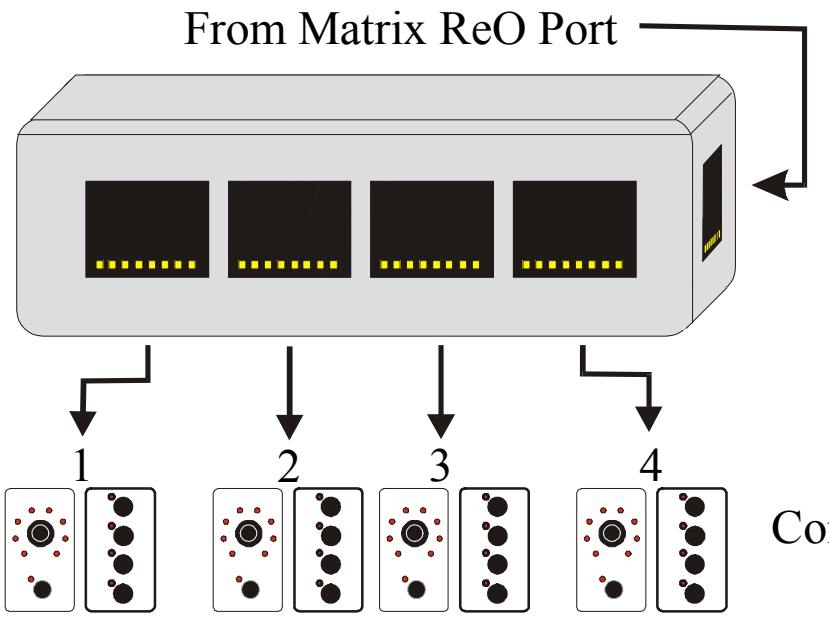


Fig. 4b Pigtail Diagram

Caution: *Take care in stripping the Cat 5. If more than 1/4" is stripped it places excess stress on the bare wire. Also, if the wirestripper knicks the copper, the wire may break easily. There should not be any bare wire showing at the back of the phoenix connector*



Comet-BA4



Intelix recommends using a Comet-BA(Bridge Adaptor) with all ReO bus LANs because it bus makes terminating and troubleshooting much easier. Legs can easily be added or removed for programming ease or narrowing down a problematic area of the bus by simply plugging or unplugging modular RJ connectors.

Comet Remote Legs

Comets can be connected using terminal strips or daisy chaining. ***The power supply should be plugged into an external source—not the matrix.*** This external supply can be the Intelix Comet Power Supply, or any other transformer with a 9-18 Vrms AC or DC output. It should be distributed with 18 gauge or heavier stranded wire. There should be a minimum of 9 VAC at each remote.

A single Comet device draws 100 mA. Do not load a supply with more than 14 remote devices.

4.1.3 ReO bus topology

The topology of the ReO bus connections can take many forms to accommodate almost any application. Among the most commonly used forms are T-connections; daisy chains, and star configurations; each of these connection types are shown in Fig. 4c.

Note: *Because of its advantages in troubleshooting and maintenance, Intelix strongly recommends using the star topology whenever possible.*

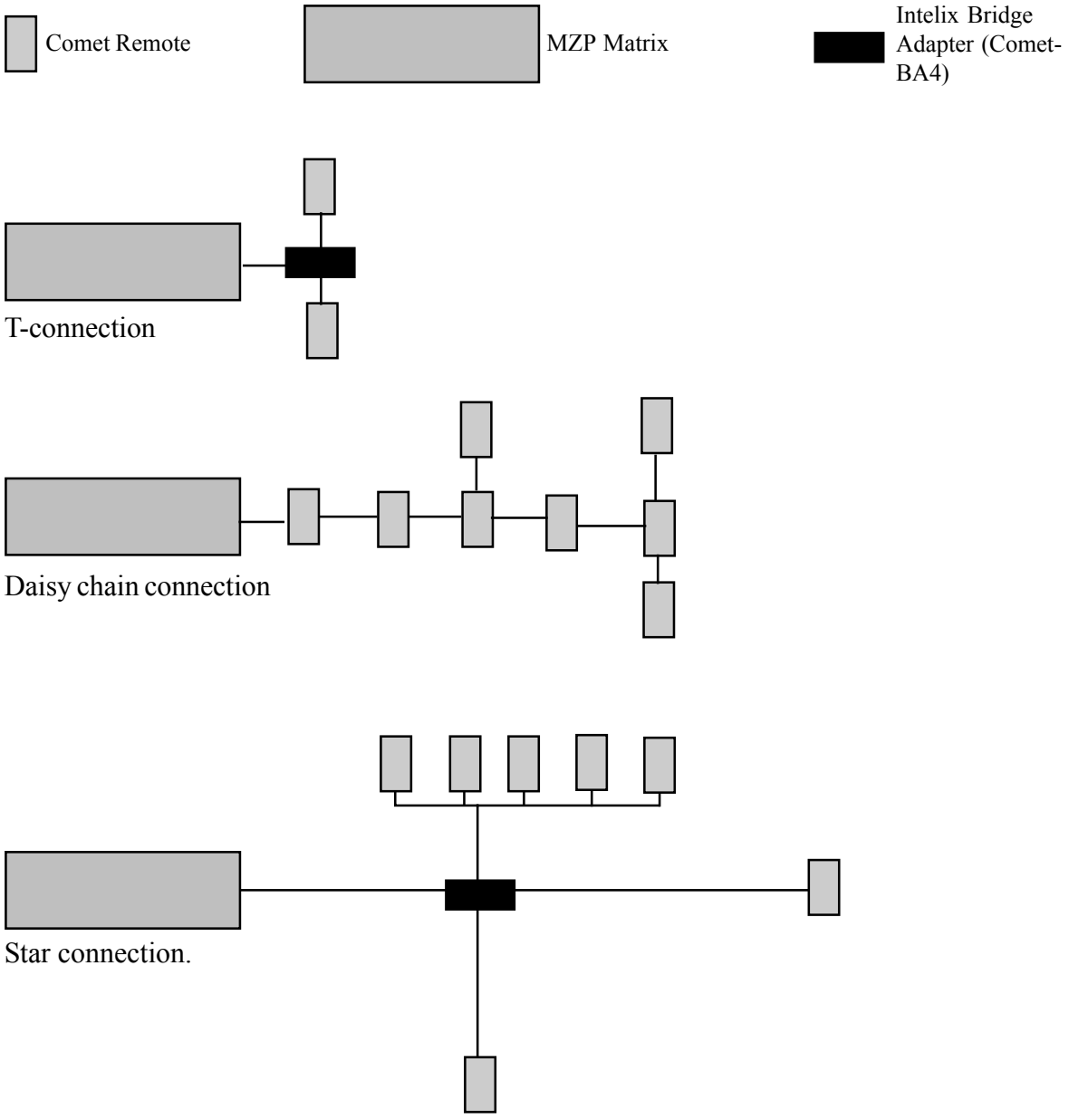


Fig. 4c Connection Topologies

4.1.4 Length of ReO bus connections

The maximum length of total ReO bus possible is 12,000 feet. With a bus length over 3000 feet, reflections become an issue and it may become necessary to terminate the bus at several points, by adding termination resistors as explained below. For bus lengths over 6000, the bus must be terminated.

4.1.5 Reflections

Reflections are returning signals bouncing back from an impedance mismatch on the ReO bus, causing phase cancellation.

Reflection typically manifests itself as intermittent transmission failures in remotes in the middle of long runs of bus. Often the remotes before and after the problem remote will work correctly. Moving the problem remote to a location that is known to work will isolate a remote hardware problem from a bus problem. Some of these symptoms also appear when a bus has excessive noise present. The solution for all these problems is to terminate the bus.

4.1.6 Termination

Termination is a technique for correcting the impendance of a ReO bus to eliminate problems arising from bus reflections and noise problems. Terminating the bus is accomplished by adding resistors at the ends of the bus legs, thus reducing the total impedance of the bus to a level that reduces noise and reflection. The value of termination resistors depends on the topology of the system. In general, the overall impedance of the bus must be lowered to 50 Ω.

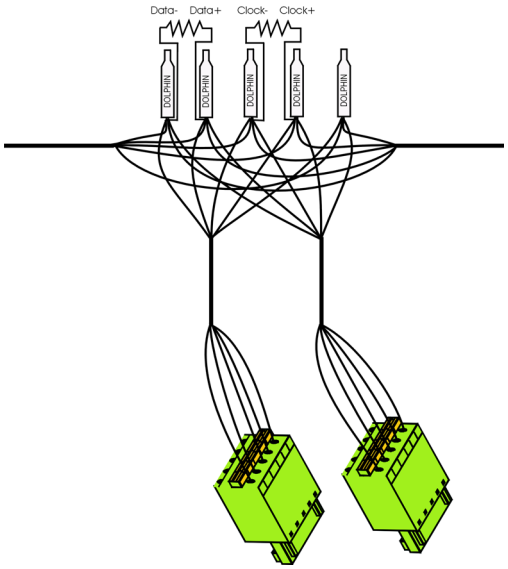
4.1.7 Calculate the value of the terminating resistors

N_{legs} = Number of legs in the system. Legs are defined as the number of home runs plus any sub legs over 500 feet..

$N_{remotes}$ = Total number of remotes in system.

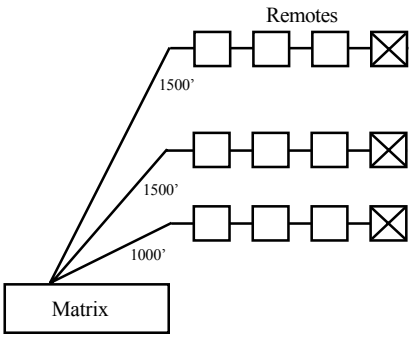
X = the resistor value to be added to *each leg* to lower the system impedance to 50 Ω. The equation below yields X. Examples follow.

$$X\Omega = \frac{N_{legs}}{[.02 - (.004545 + (N_{remotes} / 48\ K\Omega))]}$$

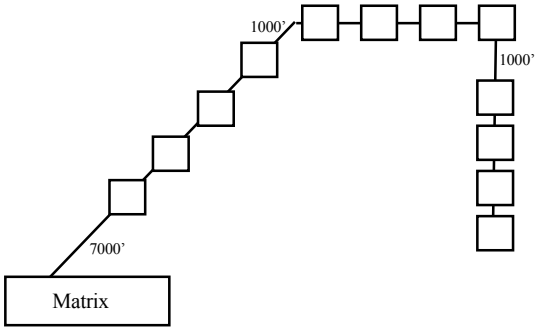


After the value for X is found, a resistor of that value across the clock lines and data lines at the remote at the end of every leg must be added. Because the system impedance **must** stay above 50 Ω, the selected resistor you should be the next size *higher* than the theoretical value. These resistors are most easily added at the terminal block where each remote is connected to the bus (shown at right).

Example 1:
The system has a total length of 4000 feet of ReO bus wire arranged in a star configuration with three home runs.There are four remotes on each run. The number of bus legs is three and the total number of remotes is 12. This bus falls in the range that may require termination. Using these values in the equation of section 4.1.7 results in a resistor value of 197 Ω. Select the next highest standard value 200 Ω. Install the terminating resistors at the remotes marked by an 'X'.



Example 1



Example 2

Example 2:
The system has a total length of 9000 feet of ReO bus wire arranged in a daisy chain. There are twelve total remotes. The number of bus legs is three and the total number of remotes is 12. This bus *must* be terminated. Using the equation of section 4.1.7 results in a resistor value of 415 Ω. Select the next highest standard value 417 Ω. Install the terminating resistors at the remote marked with an 'X'.

4.2 Power Connections to the ReO Bus

The ReO devices are *not* powered by the matrix. They *must* be powered externally. This power must be 9 to 18 V either AC or DC. It should be distributed by stranded wire, 18 gauge or heavier.

A single Comet device draws 100 mA. A single supply can service more than one remote but some systems may require multiple supplies. The voltage at any ReO bus device must not fall below 9 volts. Multiple supplies can easily be connected using the Intelix three conductor receptacle.

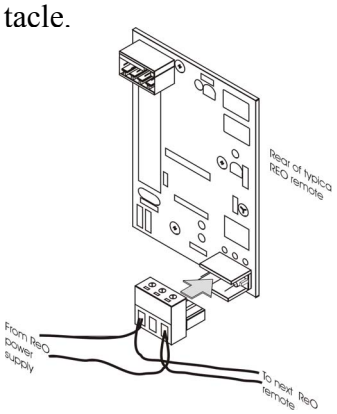


Fig. 4 e Rear view of the Comet 4 and Comet Tail devices showing Power Connection.

As Fig. 4 e demonstrates, both AC and DC can be connected to pins 1 and 3. Either pin may be designated as plus, as the remotes all have full-wave bridge rectifiers. However, for consistency and easier troubleshooting, *all* remotes should be wired in the same way.

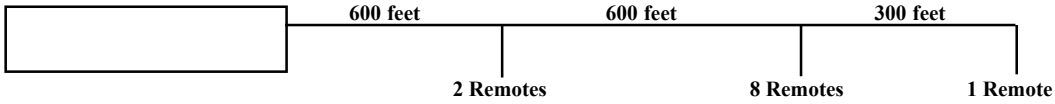
The location of the power supplies with respect to the remotes determines the amount of line loss in the power connections.

Note: If the remotes are located nearer to each other than to the main rack, the line loss can be reduced by locating the power supply closer to the remotes, and not in the main rack. To calculate line loss apply the formula on the next page.

4.2.1 Calculating line loss in the ReO bus power supply

Power Supply Voltage = $\mathbf{V_{loss}}$ + (9 to 18 V)

In most systems, the remotes will be located at various distances from each other and from the main rack. To estimate the loss in such Systems, simply add the losses of the remotes at each distance (e.g., for a system with 11 remotes, 8 remotes at 1200 feet, 2 at 600 feet, and 1 at 1500 feet):



Note: Example is using wire with a resistance of 6.2 ohms per 1000 feet.

V_{loss} = IR = (0.1 A/remote X 11 remotes) (6.2 ohms/1000 ft. X 600 ft.)

+ (0.1 A/remote X 9 remotes) (6.2 ohms/1000 ft. X 600 ft.)

+ (0.1 A/remote X 1 remote) (6.2 ohms/1000 ft. X 300 ft.)

= 4.092 + 3.348 + 0.186 = 7.626 V.

V= Voltage Loss
I= Total Current
R= Resistance of Wire

This sum should always be less than 20 V. If it is greater than 20 V, then the distance between the power supply and the remotes **must** be reduced **or** the wire gauge increased. Otherwise, the voltage experienced by the first remote in the chain will approach the breakdown voltage of the regulator inside the remote.

4.2.2 Grounding the ReO bus

Whether the power supply to the ReO remotes is AC or DC, controlled grounding is impossible if either the data connection (LAN) ground or any of the power-supply wires is shorted to the building or conduit ground. Take care to make sure that such shorts do not occur.

4.2.3 AC power supply

ReO devices are usually powered by a 12 VAC transformer. The transformer secondary is connected *in parallel* to all the remotes in the System at pins 1 and 3 of their power connections. The ground return for the data signals is provided by pins of the Phoenix connector. The remotes' electronics are grounded to the matrix via the *data* connection ground. *This is not connected to the building nor conduit grounds.*

4.2.4 DC power supply

If the ReO devices are powered by a DC voltage supply, and the DC supply has *floating or isolated outputs*, then the grounding connections to the ReO remotes should be the same as for an AC supply.

If *one side of the DC supply output is grounded, care must be taken that the supply ground connection is the same potential +/- 1V as the matrix chassis ground.* This configuration, in the presence of the ground lift jumper, can result in ground loops or large common-mode voltages between the ground of the supply and that of the data connections.

Note: When using a grounded DC supply, the presence of the bridge rectifiers in the remotes will cause there to be a 0.7 V common-mode difference between the DC supply ground and the remote ground. This difference is negligible compared to the common-mode rejection capabilities of the RS485 transceivers.

4.3 Activating ReO Bus Devices

Each ReO remote device required by the installation should be installed in its final location. When doing the initial installation, i.e. before remote recognition takes place, *do not connect the ReO bus* to the remotes.

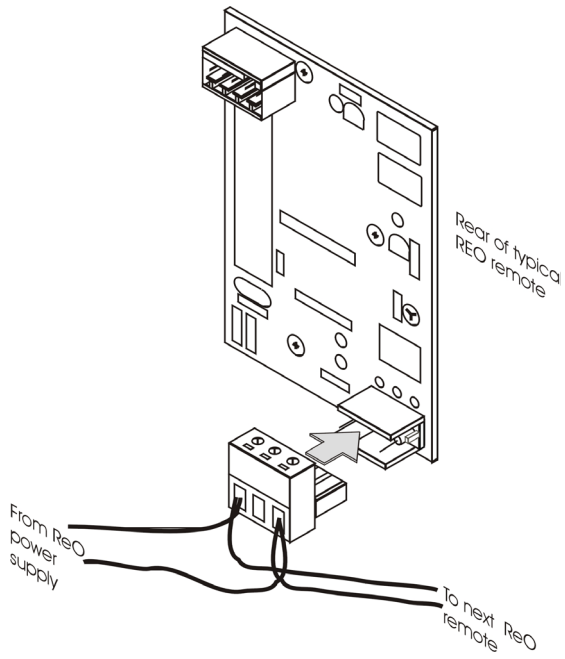


Fig. 4f This drawing shows the back of a typical ReO remote and indicates how to connect the ReO bus power connector. The ReO bus connections are shown for reference.

1) Connect the power connector as shown in Fig. 4f, then install the remote devices in their wall box, panel, or other final destination. The bottom LED on each remote will blink at about once per 2 seconds, indicating the remote has power and has not received a message from the matrix. If the remote does not single blink, troubleshoot the power supply with a voltmeter. The voltage at the remote should be in the range 9-18 VDC or AC.

2) If discovery mode is selected as a remote recognition scheme, or if the remotes are already programmed (either by the factory or on the bench), plug the ReO bus (RJ12 connector) into each remote. ***Do not connect the ReO bus to the matrix mixer yet.***

Note: Because the remotes contain a full bridge rectifier, the power connection can be made with the power plug in either orientation. For ease of troubleshooting, Intelix recommends all plugs be oriented the same way.

5.0 Installing and Starting the MZP Software

These instructions will guide you through installing and starting MZP Designer Software.

5.1 Installing the MZP Software

1) From the CD or .ZIP file, select and run the file “mzp.exe”.
2) From the main screen click on “MZP designer”, then click on “Install MZP Designer Software”.

5.2 Running the MZP Software

Open the MZP software from the Program files option in the Windows Start menu (Intelix MZP). The following screen appears:

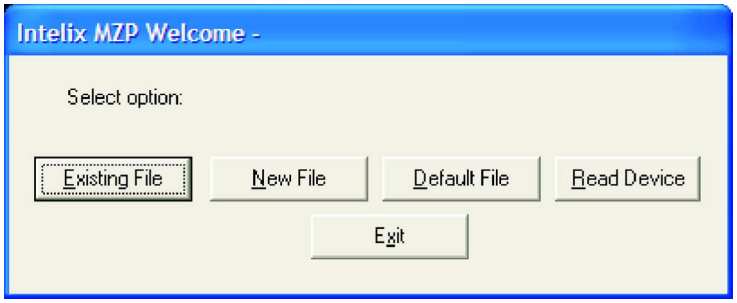


Fig.5a Intelix MZP Welcome Screen

You must now select an appropriate data source from the following choices:

1) **Existing file:** this presents a standard windows file selection screen from which any existing .mzp file that exists on the PC can be chosen.
2) **New file:** this selection will create a new .mzp file and launch the MZP Design Wizard.
3) **Default File:** this selection will open a factory-created, default software file.
4) **Read Device:** this selection connects you directly to the MZP matrix connected to your PC. The communications link must already be established.
5) **Exit:** this selection exits you from the MZP software.

After you make your selection, the main menu of the MZP software will appear.

6.0 Auto Design Wizard

This section walks through the screens needed to produce a new MZP design. The software automatically begins this design sequence when you select "New File".

6.1 Starting the Auto Design Wizard

Choose an appropriate file name for yout project and click "OK". You will be guided through a series of screens:

a) Define the Audio Matrix Size
b) Define Audio Inputs
c) Define Audio Outputs
d) Define Audio Zones
e) Setup ReO Stations
f) Define ReO Paging Stations
g) Define ReO Page Volume Stations
h) Define ReO Program Stations
i) Define Paging Volume Stations

6.1.1 Navigating in the Auto-Design Wizard

If you have made an error, or wish to change some part of the design while using the auto-design Wizard, you can move forward and backwards in the Wizard's sequence using the "Forward" and "Back" buttons on each screen.

6.2 Define the Audio Matrix Size

The Audio Matrix Size screen requires the entry of page and program input quantities, as well as output quantities. The up/down arrows (or direct text entry) on the text boxes allow the entry of audio paging and program inputs.

The software treats page and program sources differently, so it's important to set input types early on in the design process. Page sources are treated as priority over program sources; i.e., a page will always automatically duck any program source routed to a zone.

In the first screen the matrix mixer size is determined by typing the number and type of inputs and outputs. The "actual" number of inputs and outputs, shown on the right, will automatically calculate the matrix mixer size you need to the nearest 8 inputs or outputs. The screen will show you (in the "actual" column) the size of the physical matrix required for your design. If you make changes that you wish to reverse, click the Cancel button. Since this is the first screen, only "Forward" is active on this screen.

Note: Stereo audio sources count as two inputs or outputs.

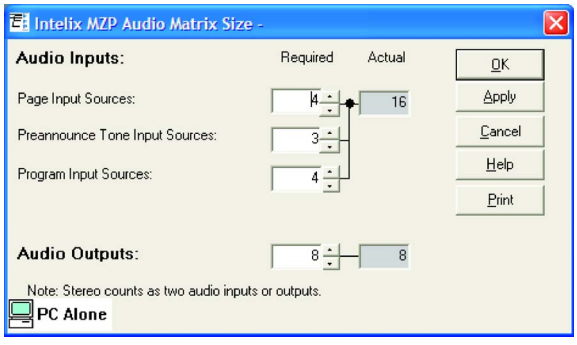


Fig. 6a Matrix Size Screen

Click OK to proceed to the next screen.

6.3 Audio Input Screen

Inputs are defined as audio sources. Inputs can be one of two types: program material or pages. This section describes how to name and define inputs.

Once the inputs and outputs are selected, the screen shown below appears. Notice that Fig. 6b reflects the number of page and program sources as defined on Fig. 6a. Paging and program sources are color coded in red and blue, respectively.

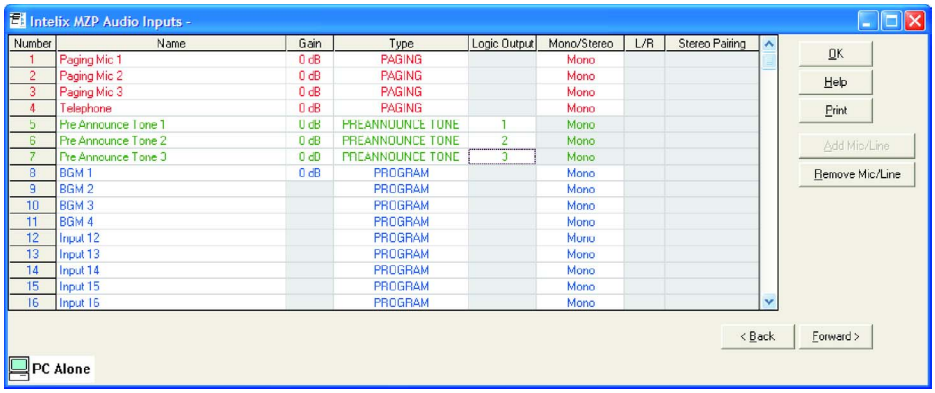


Fig. 6b Audio Inputs Screen

6.3.1 Assign names to inputs

a) Doubleclick on the name you wish to set, or arrow to the name and press *Enter*. A text box appears.
b) Type in the name you want to assign to that input.
c) Click *OK* or press *Enter*.

6.3.2 Gain control with the mic/line card

A mic/line card can optionally be added to the MZP. The mic/line card provides eight channels of preamplification and software control over a number of features.

6.3.2.1 Adding a mic/line card

To add a mic/line card to your system software:

a) Click on the "Add Preamp" button. A mic/line card is added; you will see the first 8 inputs with 0 dB gain in the Gain column.
b) To remove a mic/line card, click the "Remove Preamp" button.
c) To set up a channel, double click on the gain column for that channel. The screen in Fig. 6c appears. Select a gain range and a phantom power setting. If you click the "Auto Setup" button, the MZP will examine the input and set the optimum range automatically.

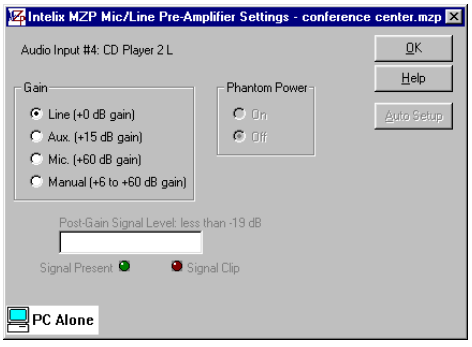


Fig. 6c Mic/Line Card Screen

Note: If you are monitoring a signal with this screen's meter, you should disable your screen saver because metering stops when the screen saver kicks in.

6.3.3 Define all input types

There are three possible input types: page, program, and pre-announce. A program input is any background source; e.g., CD player or FM tuner. Page sources, usually microphones, always have priority over program sources. When a page input becomes active, it ducks and overrides all program sources. The third type, pre-announce inputs, are special inputs used to input tones from a tone generator. These tones are applied to pre-defined page source inputs momentarily prior to activating the page source during a page.

The software has already assigned types based on your previous input. If it is necessary to redefine the type of an input, doubleclick the inputs "type" column. This will toggle the selection. The color of the input will change to reflect the new type.

Click OK to proceed to the next screen.

6.3.4 Pre-announce logic output pins

Once the input type is changed to pre-announce, the output logic column is now active for that input. When that cell is clicked on, the window in Fig. 6d appears.

There are two requirements for doing a pre-announce tone: 1) the audio source from the pre-announce tone generator (whoop-whoop!, ding-dong); and 2) an output contact closure from the MZP to the tone generator to trigger the function.

First, you must select a logic output: the logic output drop-down arrow provides logic outputs 1-8 as triggers to the tone generator. Once the logic output is selected, it will send a logic high to the selected output pin number anytime a pre-announce tone is tied to a paging source.

The last variable of the screen is the logic status, which can be toggled between logic high and logic low for the selected output pin.

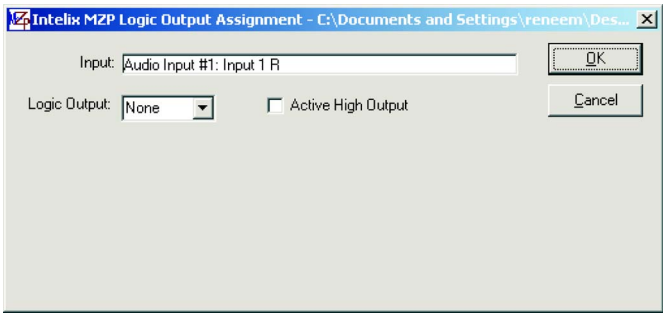


Fig. 6d MZP Logic Output Assignment Screen

Once the pre-announce tone is completed in the audio input screen, the paging station must now be setup to be tied to the desired preannounce tone. In the *Paging Station* screen, below the paging input source, there is a drop down for all of the pre-announce tone inputs from the *Audio Inputs* screen. The desired pre-announce input is selected. The final setup is the pre-announce tone duration, which is directly below the pre-announce input. This is adjusted between 0 and 30 seconds of pre-announce tone.

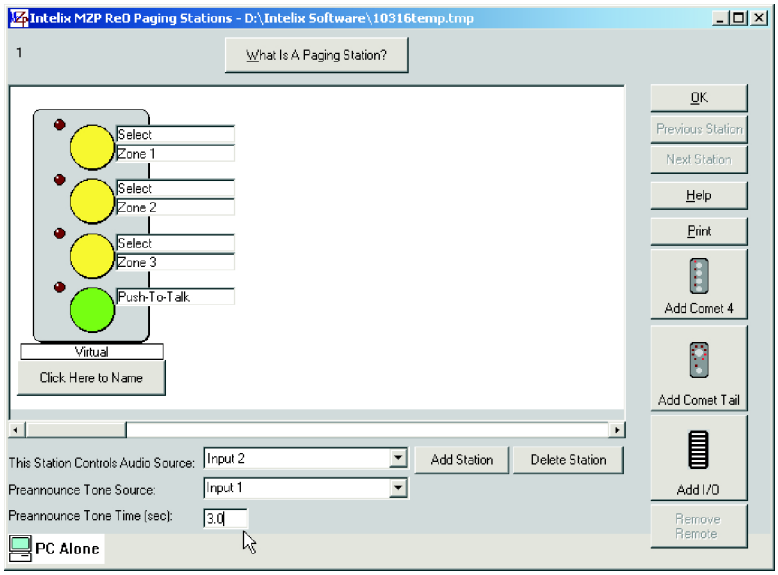


Fig. 6dd MZP Paging Station Screen with Pre-Announce Settings

6.3.5 Set input mono/stereo pairing

This function allows you to link audio inputs together as stereo pairs. Any change made to a member of a stereo pair will be automatically mirrored in the other member of the pair. When you make an input stereo, you will be prompted for more information.

a) Doubleclick on the mono/stereo box for the input to be changed. A dialog box (Fig. 6e) appears.

b) Select mono or stereo at the left of the window. If you select stereo, the selection item for left/right and partner become active. If you change a stereo source to mono, the left/right and partner information is erased from the screen.

c) Select a partner for the stereo output. The drop down list will contain only un paired mono outputs.

c) Select left/right for a stereo channel. The selection you make will be reflected in the choice for the partner.

d) Click OK when finished. Your changes will be reflected on the Audio Inputs Screen.

Fig. 6e Audio Input Stereo Pairing Screen

6.3.6 Recap of audio input screen

You have now named, typed, stereo'd and "gained" your audio inputs. Click *OK* to proceed to the next screen.

6.4 Audio Output Screen

Outputs are defined as physical connections on the matrix which will provide mixed audio signals to amplifiers or other output devices. The screen shown in Fig. 6f appears.

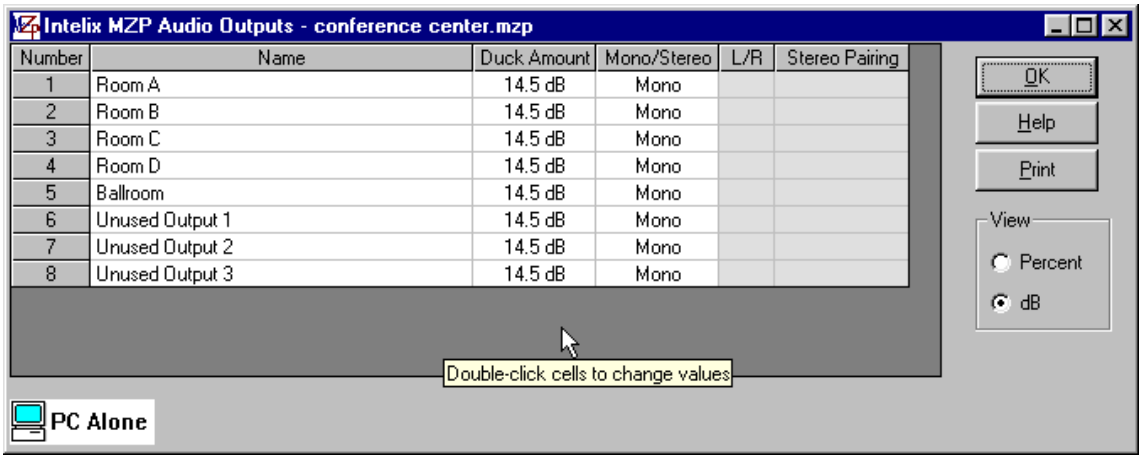


Fig. 6f Audio Output Screen

6.4.1 Assign names to outputs

a) Doubleclick the name you wish to set or arrow to the name and press Enter. A text box appears.
b) Type in the name you want to assign to that output; e.g., Room A.
c) Click *OK* or press *Enter*.

6.4.2 Set duck amounts

Ducking is the amount by which an audio output is lowered in volume when a page is present. To set the duck amount of an output:
a) Doubleclick the duck amount you want to change. A text box appears.
b) Type the new duck amount you want.
c) Click *OK*.

6.4.3 View options

You can choose two ways in which to view the duck amounts; percent (0-100%) or dB (-100 dB to 0 dB). Choose by clicking on the appropriate radio button.

6.4.4 Stereo options

Output stereo pairing is identical to input stereo pairing.

6.4.5 Recap of audio output screen

You have now named, ducked, and stereo'd your audio outputs. Click *OK* to proceed to the next screen.

6.5 Audio Zones Screen

A zone is an arbitrary logical grouping of one or more outputs. Any output can belong to any or multiple zones. Zones are the principle way in which audio is routed in the MZP. All page and program sources are routed to *zones*, not outputs.

The screen in Fig. 6g allows the naming and defining of zones. Output names are listed across the top of the grid, and zone names are listed down the left. Note that output names and zone names can be (and often are) the same.

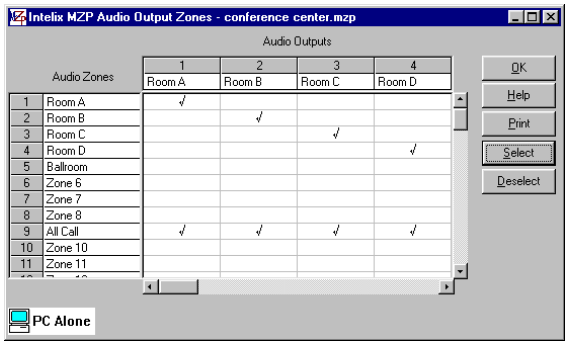


Fig. 6g Audio Output Zones Screen

6.5.1 Assign names to the zones

a) Click on a zone name. A text box appears.
b) Type in the new zone name.
c) Click *OK*.
d) Note: To accommodate long names, columns can be resized by dragging their boundaries. After dragging the boundary, click on the column.

6.5.2 Define the zones

Zones are collections of audio outputs. Your outputs are listed across the top of the grid. The members of a zone are the columns that are checked (√) in the zone's row. The default zones are each output to a separate zone and an "All Call" zone. To include or exclude an output from a zone:

a) Click on the cell you wish to change. Use the "Select" and "Deselect" buttons to toggle the output in and out of the zone. Doubleclicking toggles a single cell.
b) Groups of cells can be selected by click and drag, then Selected or Deselected.

6.5.3 Change output names

This window allows you to change output names if you wish. You need not alter output names. Output name changes here are global and appear on all screens displaying output names. To change an output name:

a) Click on the name. A text box appears.
b) Type the new output name.
c) Click *OK*.

6.5.4 Recap of zone screen

You have now named and defined audio zones, the single most important concept in the routing of audio in the MZP. Click *OK* to proceed to the next screen.

6.6 The ReO Station Setup Screen

The ReO Station Setup Screen allows you to give the program more information about your design; it allows you to enter the several different stations types your design needs. A station is a control or group of controls that affect the audio in a zone. In addition, every station screen (including this one) includes a button leading to an explanation of each kind of station ("What Is A Station?").

Use the up/down arrows (or direct text entry) to select the correct number of paging, program, program distribution, and page volume stations needed in your design.

If you delete an existing station, a warning box will appear asking for confirmation; this message can be disabled by the user.

Whenever you make a change on this screen, the cancel button becomes active; use it if you wish to undo your changes.

A change to this screen will not take effect until you click the apply button. Clicking this button saves your changes to the active file.

When ready, click *OK* to proceed to the next screen.

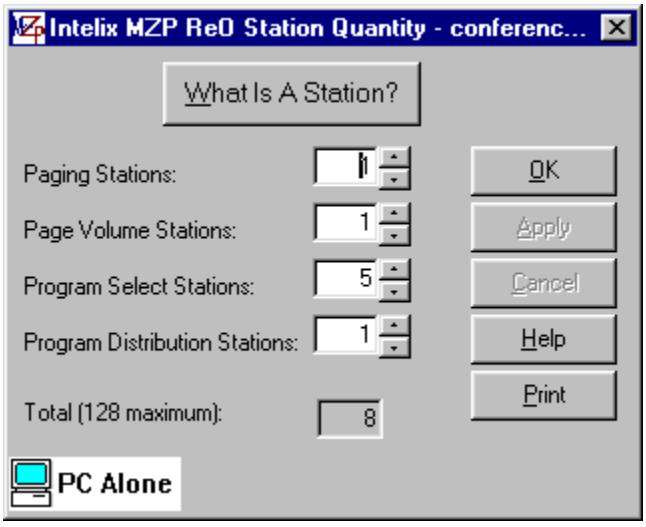


Fig. 6h MZP ReO Station Quantity Screen

6.6.1 Station overview

A station is a logical grouping of Comet remotes (Comet-4s and/or Comet Tails) which control the routing and volume of audio inputs into output zones. There can be up to 32 remotes in a single station, and up to 128 stations in a single system (each MZP is limited to 128 total remotes per system). The remotes are described in detail in Appendix D.

6.7 Paging Stations

6.7.1 Paging station explanation

The paging station allows the user to page one or more zones within the system. Physically, the paging station consists of Comet-4 remotes and an input audio source (e.g., microphone). Optionally, the paging station can include a Comet Tail remote to control the volume of pages originating in that station. A typical use of a paging station is: press select buttons to select target zones; press the talk button; make the page (it will be heard only in the selected zones); release the talk button.

Fig. 6i Typical Paging Station

Pages are routed using the following four button or logic port pin types:

1) **Zone select** - push-on zone select buttons
2) **Push to Talk (PTT)** - press to page selected zones; resets selected zones on release
3) **Cancel button** - cancels zone selections
4) **Select and Push-to-Talk** - selects predefined zones and activates page in a single button-press
5) **Emergency Priority** - emergency page to all zones (overrides all others)

6.7.1.1 Zone-select

Selects zones for paging. An operator selects one or more zones by pressing one or more zone select buttons. When a zone-select button is pressed, the LED indicator associated with that button will light if the zone is available for paging. Access is granted on a first-come basis among equal priority requests. If a zone is busy, the associated LED will blink to show that access is denied. Upon denial by the system, the operator *must* press the button again to repeat the request after a ten second zone-select timeout is implemented.

6.7.1.2 "Push-to-Talk" (PTT)

Pressing the push-to-talk (PTT) button initiates a page into the selected zone(s). First, all program sources currently routed to the selected zones will be reduced in level by the predefined "duck amount." Second, the page station microphone audio is increased to the "page level" and routed to the appropriate zones. The related page indicator LED will light at the station. Release of the PTT button or a page-length time-out (30 seconds in length) will return the system to its previous state and release the zone selections from that station.

6.7.1.3 Cancel button

Pressing a cancel button will cancel any zone selections that have been granted.

6.7.1.4 Select and Push-to-Talk operation

Select and Push-to-Talk (SPTT) buttons combine the functions of a zone select button and a PTT button. Each SPTT button is assigned to an output zone. Only one SPTT button at a time can be operated in a station. If more than one is pressed, only the first button pressed will activate. The page is active for the duration of the button press, unless a page length timeout occurs. To provide a visual reference, the indicator LED will be "steady-on" when the page request is granted. If not granted, the LED will blink and the operator must release the button and press it again to repeat the request.

6.7.1.5 Emergency priority

This button operates as a SPTT button with priority override. Pressing this button cancels and replaces all ongoing pages in the selected zone with the audio from the local microphone. The page indicator LED on the affected page stations will blink to indicate to other operators that their pages have been overridden. One or more of the paging stations may have a button assigned as emergency page. Emergency pages are not affected by the 30 second timeout, they may last as long as required.

6.7.2 ReO paging stations screen

The ReO paging station screen appears as shown in Fig. 6j. The software has already inserted the name of the only paging station ("Receptionist Mic"), inserted one Comet-4, and assigned paging buttons to the first two zones, as well as the "push to talk" function.

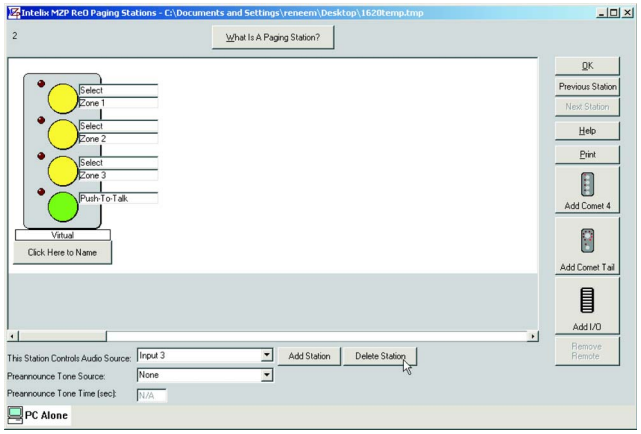


Fig. 6j MZP ReO Paing Stations Screen

Now audio sources to buttons can be assigned and the remotes can be named.

6.7.2.1 To assign inputs to buttons

1) In the label box next to the top button of the new remote, choose *Select*.
2) In the drop box below, select *Room C* or the zone into which this button will enable pages.
3) Repeat for each button needed. Unused buttons will retain their "none" label.

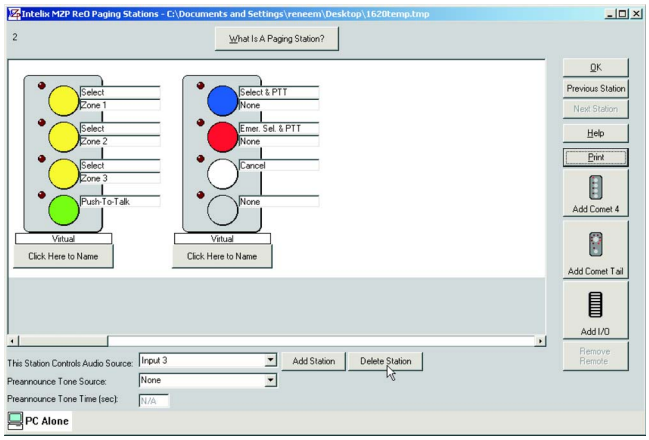


Fig. 6k This picture shows the Paging Station screen after the addition of a Comet-4 and assignment of inputs to buttons and names to remotes.

6.7.2.2 To assign names to the remotes

1) Click on the Name button, usually filled by the "Virtual Remote N" label.
2) Type the remote's name in the text box and click *OK*.
3) Repeat for each remote.

6.7.2.3 Adding and deleting remotes

To add a remote to a paging station, click either the "Add Comet 4" or "Add Comet Tail" button. The new remote will appear in the station screen, ready to be configured.

To delete a remote from a paging station, select the remote by single clicking on any button (the remote will highlight with a blue box around it). Now click the "Remove Remote" button. The remote is removed from your design.

6.7.2.4 Naming the remotes

Intelix highly recommends assigning descriptive names to your remotes at the design stage. Name them in such a way that their intended location is clear; e.g., "West side of Ballroom" and not "selector #1". This will dramatically reduce the time needed to program the hardware during the Discovery process.

To name a remote, locate the name field located below the remote's status label. The name field defaults to "Click Here to Name". Click on the field, type the remote's new name, and click *OK*. Repeat for each remote.

6.8 Page Volume Station

Each zone can have a paging volume control. This control will vary all paging volumes (and *not* program volume) *into* that zone, including emergency pages.

Comet Tail remote control units adjust the level of incoming pages to each zone. Any or all zones in the system can have a page volume station. During setup, PC software defines the maximum level of the page source to each zone. In grid-based zone systems, the ratios between the different matrix outputs within the zone are maintained. The volume control is only *enabled* while a page occurs within a zone. An associated LED bargraph always shows the current level setting (0-100%).

Typical Page Volume Station

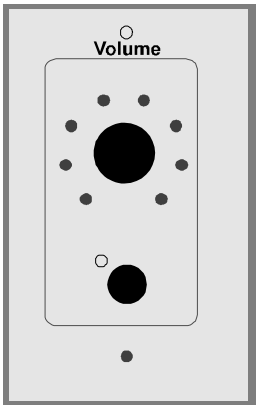


Fig. 6l

6.8.1 Duplicate stations

In each zone, any activity at one station will be reflected at all other duplicate stations in the zone. For example, adjusting the audio level at a station on one side of a room will have the identical effect on the duplicated Comet Tail across the room. The buttons, LEDs, and volume controls have identical functions on duplicated stations.

6.8.2 Paging volume station screen

The page volume station contains only Comet Tail(s). Its purpose is to provide control over the volume of pages entering a particular zone. This can be useful in a system that has different levels of ambient noise. For example, pages into an office area zone might be set at a fairly low volume, while the same pages into a manufacturing zone may need to be much louder.

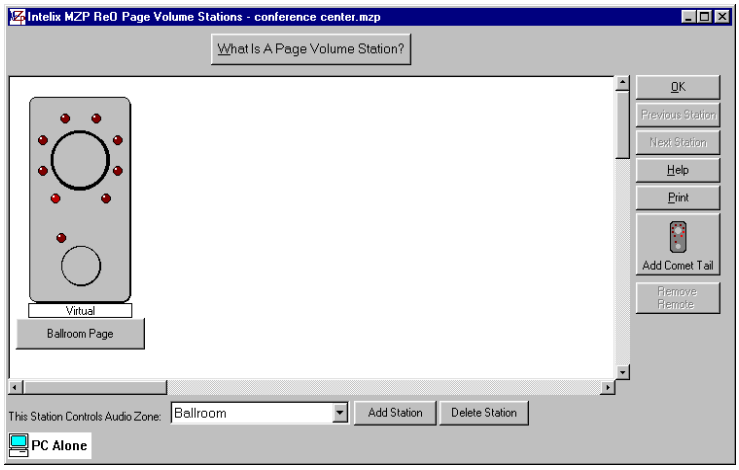


Fig. 6m Paging Volume Station Screen

6.8.2.1 Adding a page volume station

1) Click the "Add Program Station" button. The above screen appears.
2) From the drop down list of audio zones at the bottom of the screen, select the zone to which you wish to add the page volume station.

The page volume station is now added to the selected zone.

6.9 Program Select Stations

6.9.1 Program select station explanation

Program select and control stations are used to select the various program sources available to the zone and to control the program volume in a zone. These stations are normally located in the zones they control.

Typical Program Station

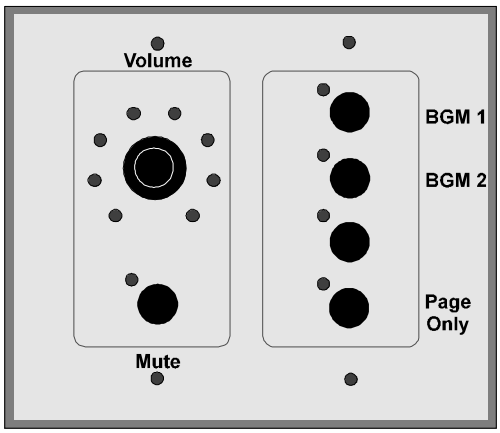


Fig. 6n

A program station can have two types of operation:

1. **Program Select**
2. **Program Mixer**

6.9.1.1 Program select

Pressing a button on this type of station will cause the selected program source to be routed to the zone for that station. In addition, the associated indicator LED on the station will light to indicate the action while the previously-selected program will be canceled and its LED is turned off. One of *N* selectors allow only one program to be routed to the zone at any time.

6.9.1.2 Program mixer

More than one program can be routed to the zone. The buttons on this type of station operate as push-on and push-off (latching function) selectors. The LEDs associated with selected programs light to indicate they have been selected. Selected programs are mixed into the zone(s) at relative levels set by the PC.

6.9.1.3 Program volume control

This optional volume control will alter the volume of the program(s) currently selected. During setup, a PC sets the maximum level of a program source to each zone and the relative levels between different matrix outputs within a grid-based zone system. The matrix mixer operates as a 0 to 100 percent (of maximum) controller. To illustrate current level, an LED bargraph always shows the current level setting (0-100%). Volume controls are *disabled* while a page is occurring in a zone.

6.9.1.4 Mute button

This function turns off the program source in a zone. *The mute button has no effect on the volume of incoming pages.* The button located under the program volume control is a latching function "mute" push-button. It lowers the audio to zero level for the zone and disables the volume control. Program routing selections for the zone are not affected by muting. The LED associated with the mute button will be lit while the mute button is active. When the button is pressed again to "unmute" the zone, program material will return at the same volume as when it was muted and the LED will go out.

6.9.1.5 Duplicate stations

Any activity at one station for a zone will be reflected at all other duplicate stations for that zone. For example, adjusting the audio level at a station on one side of a room will have the identical effect on the Comet Tail across the room, assuming they are in the same zone. The buttons, LEDs, and volume controls have identical functions on duplicated stations.

6.9.2 ReO program stations screen

The Program Stations screen is blank when it appears, and only the "Add Station" button is active. As soon as you press "Add Station", the drop down list of zones becomes active and selects the first audio zone. Thus, the first station you add will be associated with zone "Room A".

The example design has five audio sources, and each program station requires a second Comet-4. Press the "Add Comet 4" button and a new Comet-4 appears. Now assign audio sources to buttons and name the remotes.

6.9.2.1 To assign audio inputs to buttons

1) From the drop down list next to each button choose the audio source you want to assign to that button.
2) Repeat for each button requiring assignment.

6.9.2.2 Naming remotes

We highly recommend you add names to remotes; follow these steps:
1) Click on the remote's name box, usually filled by the "Click Here to Name" label.
2) In the resulting text box, type the name you want to assign to that remote. Click *OK*.
3) Repeat for all remotes.
*Note: Logic I/O remotes cannot be given a specific name.

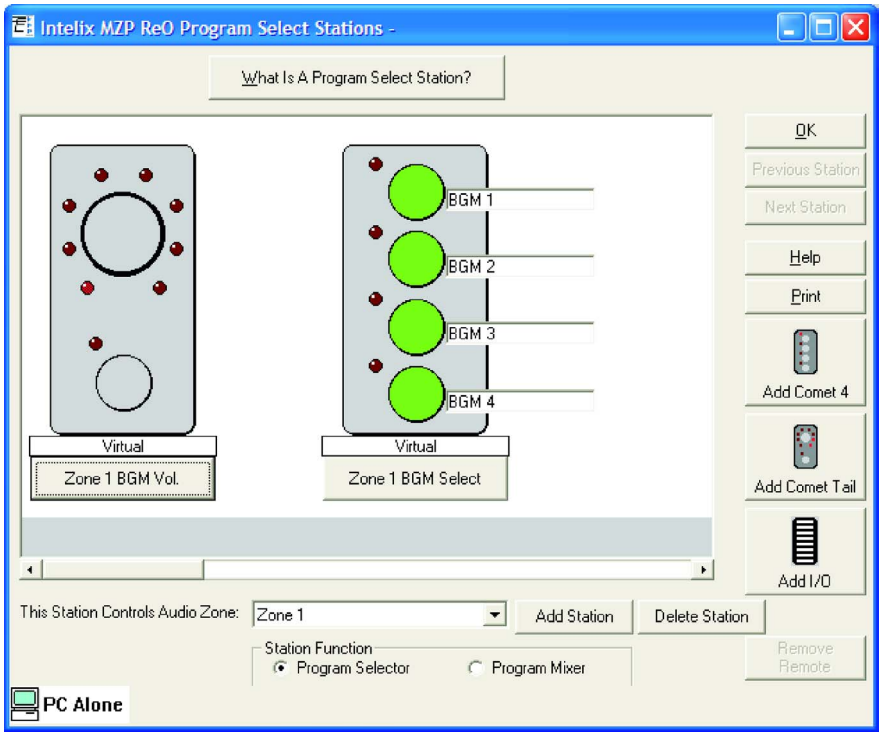


Fig. 6o This picture shows the Program Station for Room A after the addition of a Comet-4 and the assigning of sources and names as explained above.

6.9.2.3 Adding additional program stations

To add program stations:
1) Click the "Add Program Station" button.
2) In the Audio Zone drop down box at the upper left, select the zone you wish to contain the new station.
3) Assign sources to buttons and names to remotes.
4) Add other stations, using the "Next Program Station" and "Previous Program Station" to navigate among them.

6.8.2.4 Deleting remotes

Select a remote by clicking on one of its buttons; a blue box is highlighted. Click the "Remove Remote" button.

6.10 Program Distribution Station

A program distribution station allows the routing of a single audio source to multiple zones at a time. This type of station is useful under certain circumstances in reducing hardware costs and increasing security. A program distribution station is normally installed at the master rack and is not directly accessible to users. If a program distribution station sends an audio input to a zone and that input is also included in that zone's definition, the ReO remotes in the program distribution station and the program select station in the zone will mirror each other's actions and state.

If a program distribution station includes a Comet Tail (Fig. 6p), the Comet Tail will set the level of the audio input to all zones to which the input is sent.

Typical program distribution station

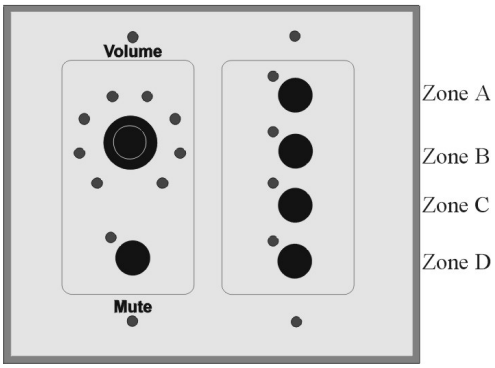


Fig. 6p

6.10.1 Program distribution screen

A program distribution station allows the routing of a single audio source to multiple zones at a time. To add a program distribution station to an existing design, follow these steps:

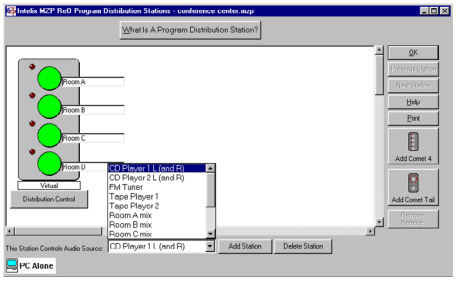


Fig. 6q Program Distribution Screen

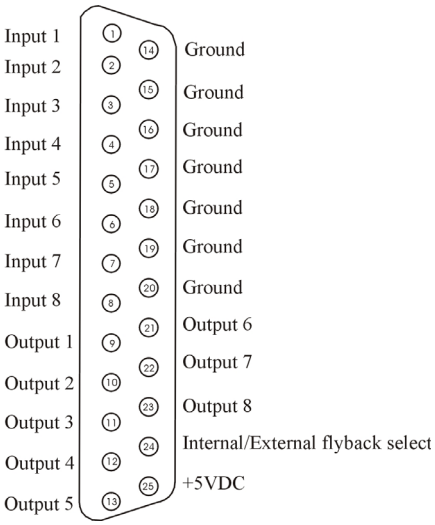
1) Click the *Add Station* button.
2) From the drop down box at the bottom of the screen, select the input to be distributed.
3) Clicking on the drop down boxes next to each Comet-4 button, select the zone into which that button will route the distributed input.

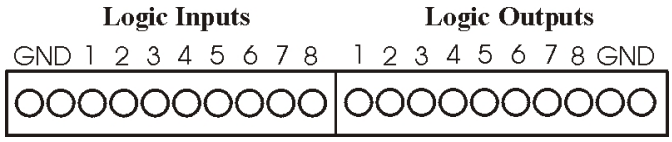
6.11 Logic I/O

The MZP has 8 logic inputs and 8 logic outputs which are generic in function. Functionality is tied to the inputs/outputs through the use of a logic I/O. When a logic I/O is added to a paging station, program select station, or program distribution station, it takes on the same functality that a Comet-4 button would take on in the station.

In any station screen following the addition of a logic I/O, the first drop-down selects which logic input or output you would like to use. Only the unused logic inputs/outputs are available in the drop-down. Assign the functionality as you would a Comet-4 button.

Logic inputs are triggered by a contact closure or 5V DC logic input to the DB25 port or preselected PCMCIA input pin. Logic outputs send 5V DC outputs from the DB25 port or preselected PCMCIA output pin.





Figs. 6r & 6s Logic pinout for MZP DB25 and MZP E PCMCIA card.

6.12 Completing the Auto Design Wizard

You have now reached the end of the auto-design wizard. Your MZP design is complete. You now have three choices:

a) **Return to the Main Screen**: This selection returns you to the MZP's main menu screen.

b) **Check Sales Report**: This selection displays the hardware needed to implement your design. The report may be printed for ordering or documentation purposes.

c) **Hardware Installation**: This item starts the Hardware Installation Wizard. Using this wizard, you can load your design into existing MZP hardware.

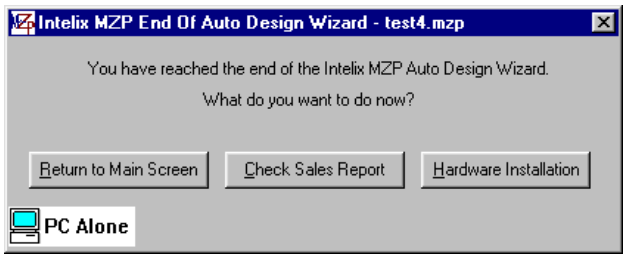


Fig. 6t End of Design Wizard Screen

6.13 Recap of Auto Design Wizard

You have specified the size and configuration of your design. You have specified and programmed ReO remote stations. You are ready to order hardware for the design, or to load the design into existing hardware.

7.0 The Hardware Installation Wizard

The Hardware Wizard is an integral part of the MZP Windows design software. Two main groups of users exist who may want to use the Hardware Installation Wizard:
1) Users who have completed a .mzp design file using the auto-designer or any other path through the MZP software and wish to load the design into an MZP matrix mixer, program, and test it. This includes contractors programming on the bench or on site. These users will be writing a design file to the MZP hardware.
2) User who wish to test the integrity of an installed wiring system, but are not loading a .mzp file. This group includes wiring contractors as separate from the system designers. These users will be reading a design file from the MZP hardware.

You should know before you begin the Wizard which of these groups you belong to, since the first screen requires that you choose between the two options before proceeding.

To maneuver through the Wizard, use the "Next and "Previous" buttons. At any time you can exit the Wizard with the "Exit Wizard" button. If you decide you have made a mistake, or forgot an instruction on a previous screen, you can move to that screen and back again using "next" and "previous".

7.1 Wizard Introduction

7.1.1 Wizard outline

The Hardware Wizard will consist of 5 major divisions:
1) RS232 Connection
2) Audio Wiring Test
3) Remote Discovery
4) Virtual Remote Assignment
5) Fine Tuning of Page and Program Levels

7.1.2 Accessing the install wizard

1) For user of the auto-designer, the button labelled "Hardware Installation" on the popup at the end of the auto-design Wizard will start the Hardware Install Wizard.
2) For other users, there is a "Hardware Installation Wizard" item under the Install menu (Main -> Install -> Hardware Installation Wizard).

7.2 The Hardware Wizard Start Screen

The first screen of the Hardware Wizard functions as a welcome and data select screen. You must know how you will use the Wizard:
If you are downloading a new .mzp file from the auto-design sequence, you will press the "Write data to MZP device" button.

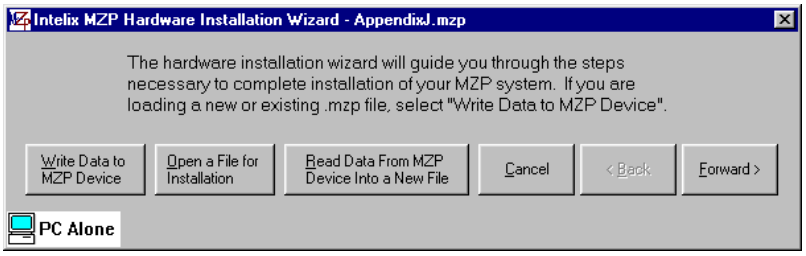


Fig. 7a Hardware Installation Wizard Screen

If you are accessing the Wizard from the main menu item (Main -> Installation -> Hardware Installation Wizard), you will click the “Open a file for installation” button.

If you will be reading an existing file from a programmed or blank (unconfigured) MZP, you will press the “Read data from MZP device into anew file” button.

7.3 Audio Wiring Test Screen

In this screen you can check to make sure you have correctly defined all audio inputs and outputs. By clicking on the View I/O button, you can look at the inputs and outputs by name in two columns allowing you to verify you have wired the audio equipment as defined on the screen.

When finished click the *Next* button.

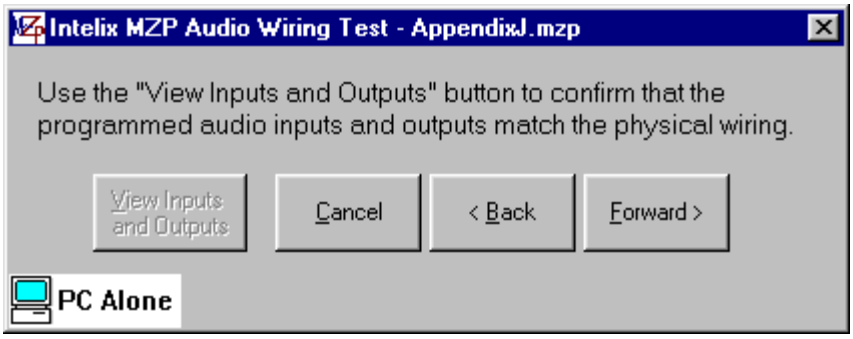


Fig. 7b MZP Audio Wiring Test Screen

7.4 Mic/Line Screen

If a mic/line card is detected in your system, this screen appears. If no mic/line card is detected, the screen is skipped. The Mic/Line screen allows you to open the “Audio Inputs” window where you can set the gain levels of inputs. Set the gain ranges by doubleclicking on the “gain” column for an input. In the resulting popup, either select a gain range manually or click Auto setup to have the MZP set up the optimum gain range. Repeat for each input. If you accidently close the Audio Inputs screen, click the “ Open Audio Input screen” button. Click the *Next* button when ready.

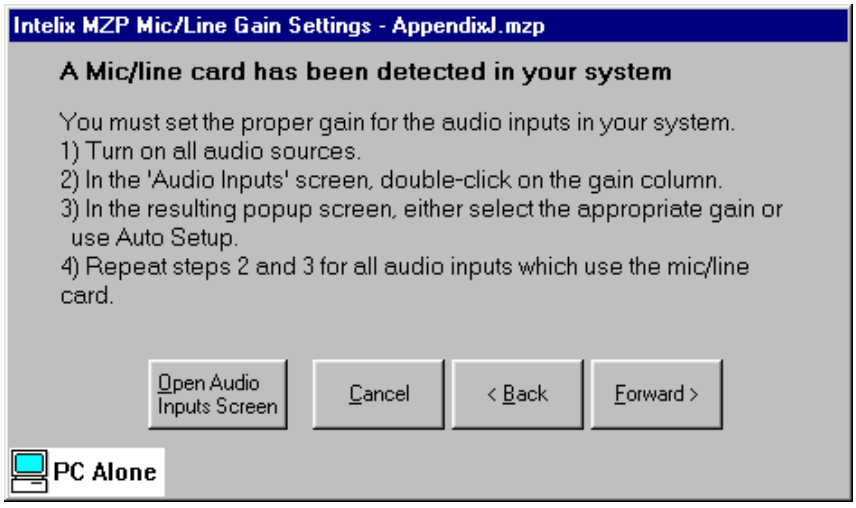


Fig. 7c MZP Mic/Line Gain Settings Screen

7.5 Audio Path Test Screen

At this point in the Installation Wizard you can test all audio path wiring. From this screen you can open the Live Crosspoint screen. By following the instructions on the Wizard screen, you can test and verify all audio path wiring.

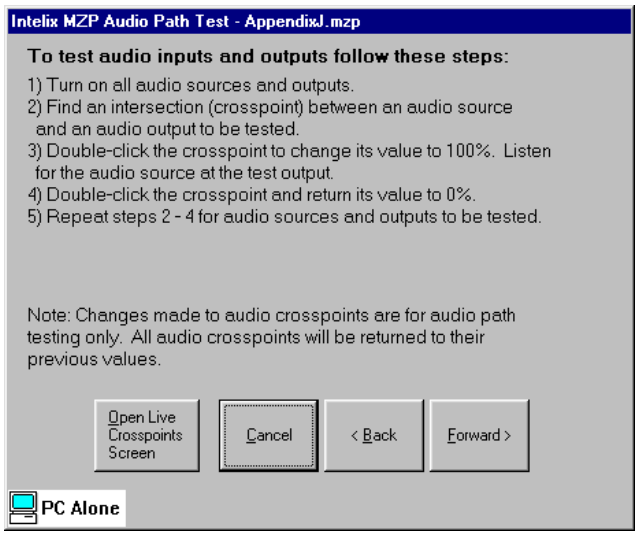


Fig. 7d MZP Audio Path Test Screen

7.6 Remote Discovery Setup Screen

This screen instructs you to power and check the MZP system in a particular sequence as preparation for discovering system remotes. When you have finished the instructions, click the *Remote Discovery List"* button and print out the resulting remote list. This list will help you in exercising the remotes. Now click the *Next* button.

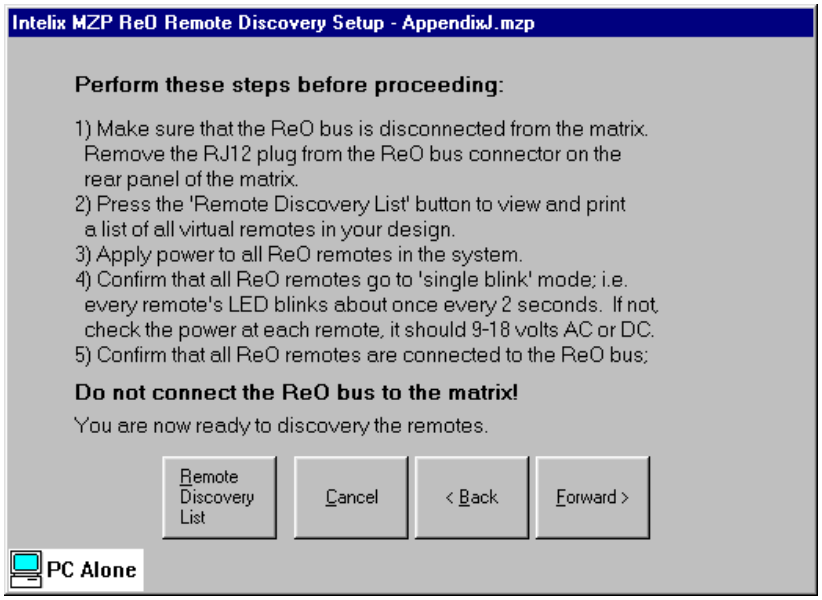


Fig. 7e MZP ReO Remote Discovery Screen

7.7 Discover Remotes Screen

Follow the directions on this screen to allow the MZP to correctly discover all the remotes used in the MZP system. After reading the instructions on this screen, click on the *Open Unassigned Remotes* button. Now execute the instructions presented on this screen. Discover and name all remotes in your system. When finished, click the *Forward* button.

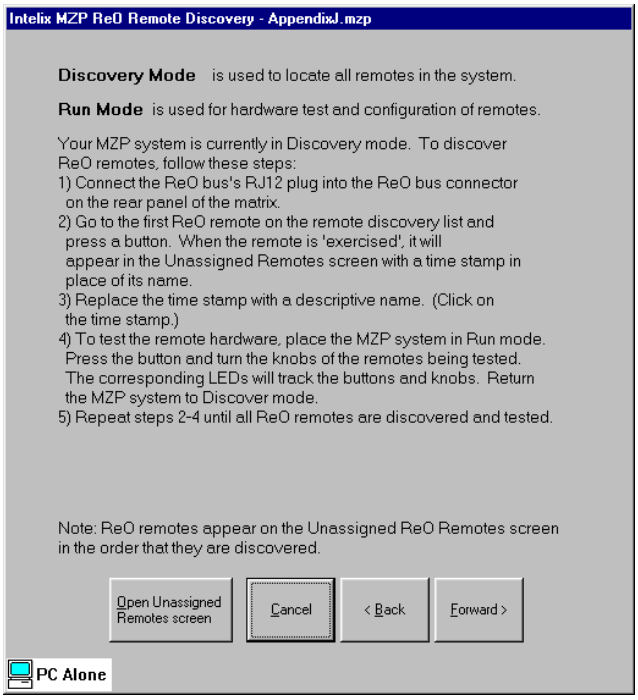


Fig. 7f MZP ReO Remote Discovery Screen

7.8 Remote Assignment Screen

On this screen you will learn to assign physical remotes to the virtual remotes in your design file. Open the Unassigned Remotes screen by clicking the *Open Unassigned Remotes* button. Open the stations you wish to program first by clicking the appropriate *Open ... stations screen*. After finishing each station type, open the next station type until all remotes are programmed. Dragging and dropping the physical remote onto the virtual remote programs the remote completely.

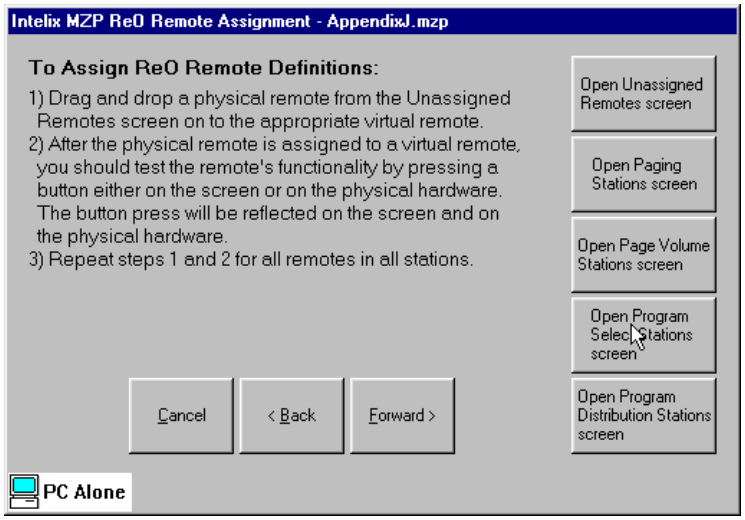


Fig. 7g MZP ReO Remote Assignment Screen

Note: Logic port pins are already assigned as part of a station.

7.9 Fine Tuning Screen

This screen allows you to open the Page and Program Level screen, where you can optimize the audio crosspoint values for your design. When you have completed the adjustment of crosspoints, click the *Open Paging Ramp Times* button. Adjust the four paging ramp times parameters as needed by your design.

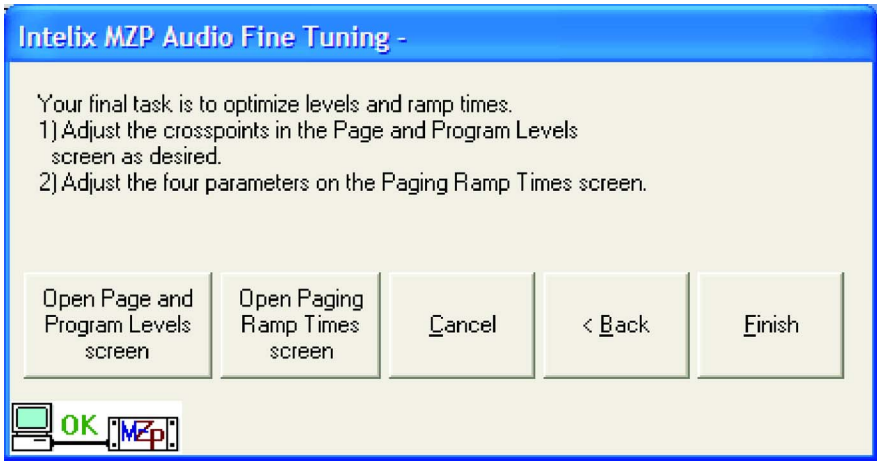


Fig. 7h MZP Audio Fine Tuning Screen

7.9.1 The *Paging and Program Levels* screen

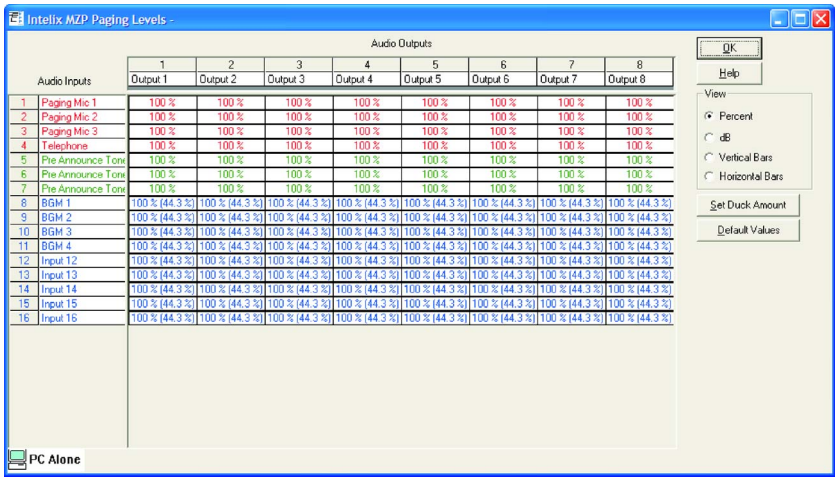


Fig. 7i This screen allows you to set the volume of a page and program level when a page is routed or turned on at a program select station. The crosspoints are represented as a grid of inputs (listed down the left) and outputs (listed across the top). Changing a crosspoint alters the volume of that input to the *specified output only*. These changes are live only when routed.

7.9.1.1 Changing a crosspoint level

1) Doubleclick the crosspoint you wish to alter. A text box appears.
2) Type the desired value. Click *OK*.
3) Repeat for all necessary crosspoints.

7.9.1.2 Setting default values

To set all crosspoints to the full on setting (100% or 0 dB), click the *Default Values* button. After a confirmation, all crosspoints will be set to 100%.

7.9.1.3 Viewing crosspoints

You can view crosspoint settings in percent, dB, vertical bars, or horizontal bars. Select the desired view by selecting an option button in the "view" at the right edge of the screen.

There are four parameters associated with ramp times:

1) **Program source duck time**: the amount of time the program material ramps down when a page becomes active.

2) **Program source return time**: the amount of time the program material takes to return to its prepage level after a page.

3) **Page source ramp up**: the amount of time for a page input to reach full paging volume.

4) **Page source ramp down**: the amount of time for a page input to return to zero volume after a page.

As shown in Fig. 7j, the screen allows entry of values for all four parameters. An interactive graph shows the magnitude and relationship among the four parameters. The parameters are limited to values between 0 and 30 seconds.

The *Set Duck Amount* button allows you to change the amount of ducking for each output from this screen. Duck amounts can also be set in the Audio Output screen.

7.9.1.4 Changing the paging ramp time parameters

1) Either click and hold down the up/down arrows on the spin boxes, or make direct text entry into the boxes. If you use the arrow method, you can watch the graph interactively change to the new values.

2) If you wish to alter ducking amounts, click the *duck amount* button and enter the new values in the resulting screen.

The default for page timeout is 30 seconds.

Page timeout means a normal priority page will end after a set amount of time. The Intelix default setting is 30 seconds. If *unlimited* is selected, then a normal priority page will never timeout. Page timeouts are adjustable in increments of 15 seconds.

*Note: Emergency level pages will never timeout.

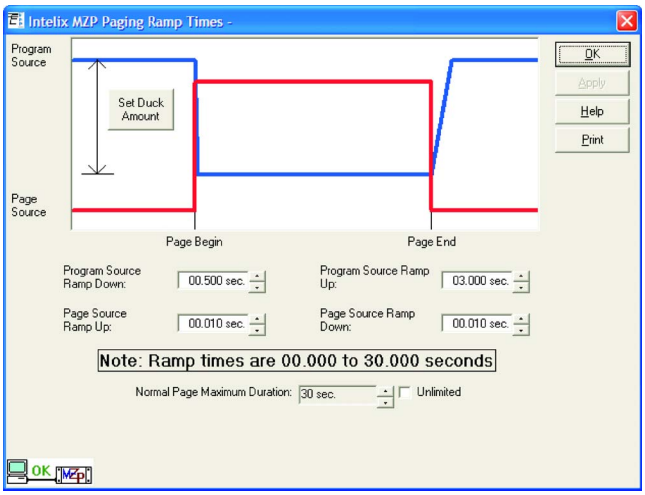


Fig. 7j MZP Paging Ramp Times Screen

8.0 Activating ReO Bus Remotes

This section covers how to activate ReO bus remotes in the Intelix MZP.

8.0.1 Bus modes overview

There are three modes in which the MZP system can operate: Run mode, Halt mode, and Discovery mode.

8.0.2 Changing bus modes

To change between Run, Discovery, and Halt modes, open the Unassigned Remotes screen (Main -> Installation -> Unassigned Remotes).

8.0.3 Run mode

Run mode allows the system to function normally; i.e., it polls each remote in the system on a round-robin basis and processes the remote commands. *This is the mode in which the system must be left after programming.*

Run mode also allows system alteration to a limited degree. If a single remote control is added to the system while it is in Run mode, that remote will be recognized and correctly added to the system. If multiple remotes are to be added at one time, the system should be put in Discovery mode.

8.0.4 Discovery mode

Discovery mode allows the addition of multiple ReO remotes at a time, as when a new system is first programmed. Each remote added must be exercised in a known sequence to allow correct discovery by the MZP matrix.

Discovery mode is normally used only during initial setup and programming of a system.

In the discovery process, the MZP will be told to discover and report all ReO remote devices connected to it. *Remotes are discovered in the order they are exercised* (a knob turn or button press), so it is critical to have an ordered list in which you will exercise them. As each remote is discovered, it is displayed on the Unassigned Remotes screen, and can then be assigned to the stations in your design by clicking and dragging on screen. After discovery and assignment are complete, you will put the MZP in Run mode to test operation of the system.

To use Discovery mode, complete the following steps:

1) In the MZP software, open the Unassigned remote screen (Installation -> Unassigned ReO Remotes).
2) Click on the *ReO Mode Discovery* button.
3) Obtain the ordered remote list from the menu item (Reports -> Stations -> Remote Installer's List ->Print).
4) Using the list, go to each physical remote and take these steps:
    a) Verify the remote's LED is in double blink mode.
    b) Locate the remote on your ordered list of remotes. The list should contain a virtual remote with a name that corresponds to the physical remote's location. Mark this remote in the visitation order column so that you can determine the

order youexercise the remotes.
c) Exercise the remote (press a button or turn a knob).
d) Verify the remote's LED goes to steady off, indicating that the remote has been recognized.

5) Repeat steps 4a-4d for all remotes. After all remotes have been exercised and have appeared as "responding" on the "Unassigned remotes" screen return to the PC.
6) Name each remote on the unassigned remote screen with an indicator of its physical location; e.g., "west side of Room A".

8.0.5 Halt mode

Essentially, Halt mode stops traffic on the ReO bus, "halting" remote communication. Specifically, Halt mode allows you to perform a "write" to the MZP without disconnecting the ReO bus. The Halt mode process is performed automatically during a write in MZP Designer Software version 3.3.59 or later.

During Halt mode, any actions on the ReO bus (i.e., volume toggling, source selection, etc.) will be stored in a queue and rapidly exercised when the bus mode is returned to "run" or the write process is completed.

8.1 Remote Assignment

The process of programming the physical remotes consists of dragging the image of the physical remote from the Unassigned remote screen and dropping it on the corresponding virtual remote in the station screen.

If the names of the physical and virtual remotes are a good match; i.e. are easy to match with one another, this process can go very quickly. If the names do not correspond well, you may need to do some searching to determine which ones correspond. The Intelix software provides a number of diagnostic tools to simplify this process.

8.1.1 A drag and drop example

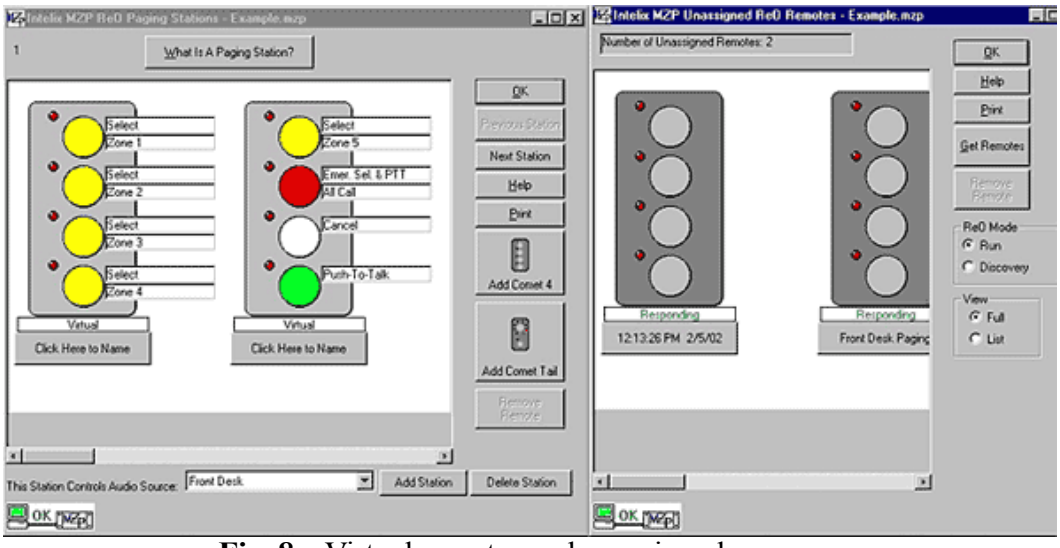


Fig. 8a Virtual remotes and unassigned screen

Position the two screens as you see them here. You can use the scroll bars to view hidden remotes.

If you don't remember which remote is which, you can locate them by double clicking an LED. The LED will then blink in the software and on the real remote.

Select the correct unassigned remote and drag it to the correct virtual remote.

Immediately after you drop the remote, you will be asked to give it a name

Note: Why Naming and Discovery Sequence are Critical
Remotes are discovered by the MZP in the order they are exercised. When remotes are first discovered by an MZP matrix, the remotes are undifferentiated; the matrix cannot tell the difference between one Comet-4 and another. In order for the installer to assign physical remotes to correct virtual remotes in the design program on the PC, there must be a way to differentiate the remotes.

As you visits rooms and stations, the remotes you exercises are recognized and appear on the PC screen in the order visited. They will appear in the Unassigned Remotes window in order of discovery, left to right and top to bottom.

When you return to the PC to assign virtual remotes to the newly recognized physical remotes, you must be able to distinguish among the remotes on the screen.

There are two things you should do to make this process simple. First, carry the Remote Installer's list (generated from Reports -> Stations -> List -> Print). Everytime you exercise a remote, mark its physical location and its sequence number; for the first remote visited, mark it as sequence #1 and an appropriate name; e.g., "west side of Ballroom".

Next, verify you have given good descriptive names to both the physical remote (i.e., "west side of ballroom") and to the virtual remotes in the design program on the PC. Ideally, the virtual names should be the same as the physical ones. Names of virtual remotes can be changed at any time. Ensure you have descriptive, useful names for all remotes.

8.1.2 Non-responding remotes

If any remotes in the Unassigned Remotes window have a status indicator reading "Not responding", they have lost communication since you exercised them and should be repaired before proceeding. There are two main causes for the problem: power and ReO bus. Pull and replug the power plug. The remote's LED should go to single blink, then double blink. This indicates that communication has been restored. If the remote still does not respond, there is a problem in the ReO bus; either an intermittent problem in the ReO connector at that remote, or noise and reflections on the bus.

8.1.3 Searching for a lost remote

If you have a physical remote in the unassigned remotes screen that you cannot match with a virtual remote on the PC screen, double click on an LED of the mystery remote in the unassigned remote screen. This will cause that LED to blink at about .5 Hz both on the PC screen and on the remote in the real world. Now leave the PC and search for a remote with its LED blinking at that rate. When it is found, note its location, return to the PC, and rename it in the Unassigned remote screen with a name that makes its location obvious. You can now assign it to its corresponding virtual remote.

8.1.4 Retracting a mistaken drag and drop

If you accidentally drag and drop a physical remote to a virtual one, and realize that you have dropped it on the wrong remote, you can undo the error simply by dragging and dropping the remote back to the unassigned remote screen. It is now unprogrammed again and ready to be dropped onto the correct virtual remote.

8.1.5 Testing remotes with a two person team

If two people are available system testing, it is efficient to do as follows: On the PC bring up the station being tested (Paging Station or Program Station screen). Send the second person to the physical remote and have them press the buttons and turn the knob (if any). The actions at the physical remote will appear on the PC screen, verifying that the remote is working correctly.

8.2 Hardware Test Mode

Hardware test mode allows buttons in Intelix MZP Designer Software to be automatically linked to their LEDs on the physical comet device using the Unassigned Screen in Run Mode. Once in hardware test mode, pressing a button in Run Mode will cause the LED to light on the associated device. This is a looped process and is used for diagnostics only--the process is not connected to any logic.

8.2.1 Remote blink codes

The LEDs on remotes have five main blink codes to assist determining the state of a remote (these codes appear only on the physical remotes, not on the PC screen):

a) **All LEDs off**: either not powered or normal run state; if new system check power supply to remote.

b) **Single blink**: powered but no communication. ReO data bus problem or not yet exercised. If new system, there is a problem in the ReO bus to that remote.

c) **Double blink**: powered up and received a message from the matrix.

d) **Triple blink**: This state means a message has been lost between the matrix and the remote. ReO bus problem. Check for noise or reflection conditions on the bus.

e) **Steady on**: custom programmed state, unknown meaning.

Remember:For correct operation of the system, you must go to Run mode after all modifications are complete.

9.0 MZP Windows® Reference

This section is organized by menu items. For each item on the main MZP menu, there is a section detailing the uses of the selections under that item. The major items are:

1) File
2) Configuration
3) Reports
4) Installation
5) Help

9.1 The File Menu

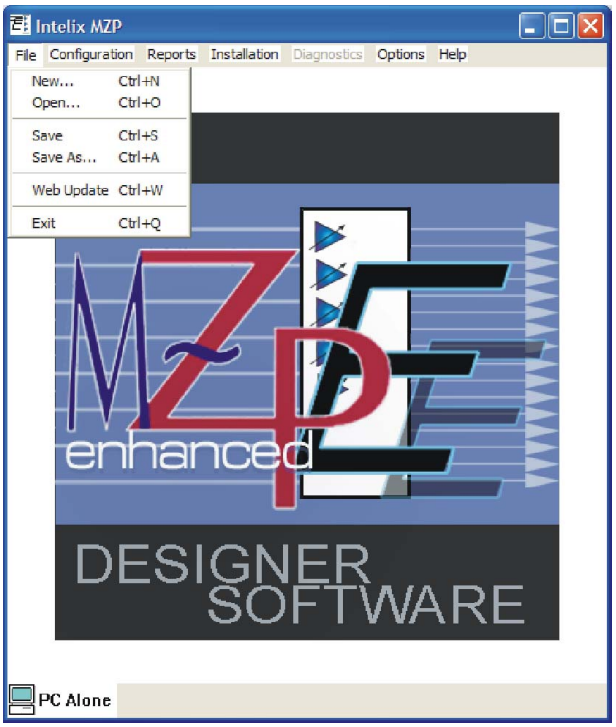


Fig. 9a The File Menu

9.1.1 The *New* item

Selecting the New item from the file menu causes a prompt for the path and name of the new file to be created. After you have specified a name and path, the software starts the auto-design process, which is a series of screens presented in sequence to guide you through the design process. You are informed that auto-design is about to begin; clicking *OK*will allow you to proceed. During auto-design, the new file is automatically saved after every window in the sequence. If you click *Cancel* you are returned to the MZP main screen.

9.1.2 The *Open* item

Selecting the *Open item* from the file menu causes the software to prompt you for the path and name of the file you wish to open. After you have specified the path and filename, the software opens that file, showing progress as it does so. On a fast machine or a small file, this progress indicator may be barely visible.

9.1.3 The *Save* item

Choosing the *Save item* from the File menu causes the software to save the currently open file to disk. All changes since the last save are updated.

Note: During auto-design (triggered by the New item) the file being created is automatically saved after every screen. *This is only true during auto-design.*

Read, write, and live changes do not affect the disk file until a "save" is performed. However, any changes made in the screen when connected to a matrix will change the program file in the matrix.

9.1.4 The *Save As* item

Selecting *Save as* from the File menu allows the user to create a new file based on existing ones. If a new program requires only a single change to an existing file, open that file with the Open item, make the change and select the *Save As.. Item*. You will be prompted for a path and filename. The new file will then be saved under the new name and the original file unchanged under the old filename.

9.1.5 The Web Update Item

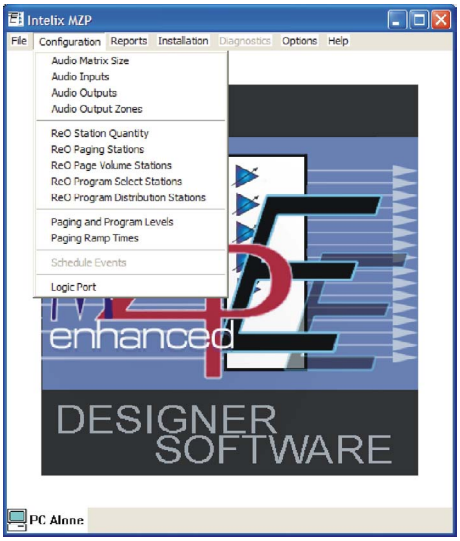
Selecting the Web Update Item instructs you how to go to the Intelix web site, where the newest versions of Intelix software can be downloaded. Read the instructions on the screen to reach the download site.

9.1.6 The *Exit* item

Selecting the *Exit item* from the file menu closes the MZP software and returns you to the desktop. If you have made changes to a file, the program will ask you if you wish to save the changes.

9.2 The Configuration Menu

Fig. 9b The Configuration Menu



9.2.1 The *Audio Matrix Size* item

The audio matrix size window allows the designer of an MZP system to define the size of the matrix required for the design using either the scroll button or directly "typing" the desired number of Paging Inputs, Program Inputs, and Audio Outputs. The windows keeps track of the total size of the matrix needed to accommodate the specified numbers. This size is displayed in the "actual" column.

The *Help* button pops up a help screen for this screen.

The *Print* button sends the matrix size report to your printer.

9.2.2 The *Audio Inputs* item

The audio inputs screen allows the designer to define all inputs in the system. All parameters of the inputs can be set (except the number).

9.2.2.1 Name

Name (up to 20 characters) is changed either by doubleclicking the name or using arrow keys to select it, then pressing *Enter*. Type the new name and click *OK* or press *Enter* again.

9.2.2.2 Adding a preamp

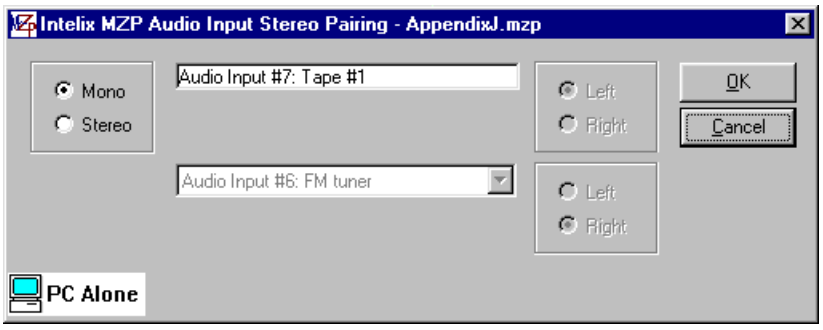
Click on the gain column to enable the "Add Preamp" button. After a mic/line card has been added, clicking on a gain column allows the setting of gain and other input parameters.

9.2.2.3 Input type

Type must be one of three choices: page, program, or pre-announce. A paging source is a microphone, while a program type is a music or other audio source, such as a CD player or tuner. An input's type is changed by doubleclicking on the type, which toggles between the two types.

9.2.2.4 Stereo pairing

Stereo pairing allows the user to define an input as monaural or as a member of a stereo pair. To change the mono/stereo setting of an input, click on the cell to be changed. The resulting popup presents a choice of stereo or mono, as shown in Fig. 9c.



If stereo is selected, the boxes for selecting a stereo partner and let/right choices become active. When you click *OK*, the changes will be reflected in the mono/stereo, L/R, and stereo pairing columns.

Fig. 9c MZP Audio Input Stereo Pairing Screen

9.2.3 The *Audio Outputs* item

The outputs item allows the designer to configure the system's audio outputs. All parameters of the outputs can be altered (except the number).

9.2.3.1 Name

To change the name of an output either doubleclick the name, enter the new name and click *OK*; or use the arrow keys to reach the name you want, press *Enter*, type the new name, and press *Enter* again.

9.2.3.2 Duck amount

Duck amount is the amount by which an output is ducked (lowered) when a page into that zone becomes active. To change the value, doubleclick or arrow to the desired cell, press *Enter*, type the new value, and press *Enter*.

9.2.3.3 Mono/Stereo

Doubleclicking on this column allows the user to define an output as monaural, or as a member of a stereo pair. The "L/R" and Stereo Pairing columns reflect the assignment of stereo pairs.

9.2.3.4 Help button

The help button pops up a help screen.

9.2.3.5 View options

The values in the output screen can be viewed in two different ways: in percent of full scale (range 0 to 100%) or in decibels (range -100 dB to 0 dB). Choose your preference by clicking the appropriate option button at the right of the screen.

9.2.4 ReO station quantity item

The ReO station quantity screen allows the designer to input the number of the various types of stations required by the design. These types include:
- Paging Stations (route a single paging source to multiple zones)
- Program Stations (route multiple program sources to a single zone)
- Paging Volume Stations (control page volume into a single zone)
- Program Distribution Stations (route a single program input to multiple zones)

Use the up/down arrows or direct text entry to change the values.

You can have any combination of station types as long as the *total* number of stations in a system is less than 128. A warning will appear if you attempt to exceed the 128 station limit.

9.2.5 Audio output zone item

This screen allows the designer to specify what outputs are present in each zone. A zone is an arbitrary collection of outputs; any output can be included in multiple zones.

The screen shows a grid of outputs (across the top) and zones (down the left side). If the intersection of a row (zone) and column (output) is checked, the output is a member of that zone.

9.2.5.1 To toggle a single cell

Doubleclick on the cell. This toggles the output into and out of the zone. You can also select the cell by single clicking on it, then use the *Select* and *Deselect* buttons.

9.2.5.2 To change a range of cells

Click and drag to select the group of cells (they highlight). Now click on *Select*/*Deselect*.

9.2.5.3 To change zone names

Click on the name (the row highlights). Click the *Zone Name* button, type the new name and click *OK*.

9.2.5.4 To change output names

Click on the name (the column highlights). Click the *Output Name* button, type the new name and click *OK*. *Note: You can drag the column boundaries to accommodate long names.*

9.2.6 ReO paging stations item

This item allows the designer to define the hardware and its programming for each paging station in the system. Fully defining a station consists of two steps: assembling the remotes needed and programming the remotes, both of which are accomplished in this screen.

For each paging source defined in your file (from the audio inputs screen), the software will create a paging station automatically. The modifications your design requires must be completed manually; **move through the list of paging stations** by clicking the *Next Paging Station* and *Previous Paging Station* buttons. The title of each paging input will appear in the text box at the top of the screen as its station is displayed.

9.2.6.1 To add a remote or a logic port pin to a paging station

Click on the *Add Comet-4, Logic I/O,* or *Add Comet Tail* buttons.

9.2.6.2 To delete a remote or a logic port pin from a station

Select the remote by clicking any of the remote's buttons (the remote will highlight), then click the *Delete Remote.*

9.2.6.3 To assign a function to a button

Click the drop list next to the button; a list of possible functions drops down. Select the function you wish the button to have. Note: Each function changes the color of the button for easy reference. The button functions are described below:

1) **Select and Push-to-Talk** (blue) – for the duration that this button is pressed, a page will execute to the selected zone. The zone is selected by the second drop-down.
2) **Select** (yellow) –This option chooses the zone to be paged into. When exercised, this button latches on for ten seconds or until a push-to-talk command is executed.
3) **Push-to-Talk** (green) – for the duration that this button is pressed, a page will execute to the selected zones.
4) **Emergency Select** (red)– This option chooses the zone to be paged into. When exercised, this button latches on for ten seconds or until a push-to-talk command is executed. However, unlike *Select*, Emergency Select has emergency priority and will override any current, normal priority pages.
5) **Emergency Select and Push-to-Talk** (red)– for the duration that this button is pressed, a page will execute to the selected zones. However, unlike *Select and Push-to-Talk*, Emergency Select and Push-to-Talk has emergency priority and will override any current, normal priority pages.
6) **Cancel** (white)– deselects all zones currently selected.
7) **None** (grey)– the button has no current function.

When you choose any function that requires an associated zone, a list of zones (as defined in the audio zones screen) appears (in a list box below the function type). Select which zone will be selected by this button. Repeat this process for each button in the paging station.

9.2.6.4 Naming a remote

Click on the name box (initially containing "Click Here to Name") type in the new name and click *OK*.

The **status indicator** (above the name) will have one of three labels:

1) **Virtual** – not connected to an MZP matrix, all remotes in PC stand-alone mode
2) **Responding** – connected to an MZP matrix and responding correctly to system messages
3) **Non-responding** – connected to an MZP matrix but not responding correctly to system messages

9.2.6.5 Adding a Comet Tail

Adding a Comet Tail to a paging station allows the operator of the paging station to control the volume of all pages originating at that station.

9.2.6.6 Adding a Comet 4

Selecting this option adds one four-button selector. Each button can be tied to a zone for paging.

9.2.6.7 Adding a Logic I/O

Selecting this option adds one logic input or output. Setup of the PCMCIA input/output is the same as a button on the Comet 4. A logic I/O does not require the discovery of hardware; when live to a box the logic I/O is active.

9.2.7 The *Page Volume Station* item

This screen allows the designer to specify each page volume station in the system. A page volume station controls the volume of all pages into a zone.

Each paging volume station consists of a single Comet Tail remote, or multiple Comet Tails that are functionally identical.

Page volume stations may be toggled through using *Next* and *Previous* buttons.

9.2.7.1 Changing the name of a remote

Click on the name box, enter the new name and click OK.

9.2.7.2 Deleting a station

Use the *Next* and *Previous* buttons to select the station, then click the *Delete station* button.

9.2.7.3 Assigning the zone

At the lower center of the *Page Volume Station* screen the zone associated with the volume control is displayed. To change this zone, double-click on the drop-down arrow and select the desired zone.

9.2.8 *ReO Program Select Stations* item

This item allows the designer to define and program the hardware for each program station in the system. Defining a program select station requires two steps: assembling the remotes needed and programming the specific buttons of each remote, both of which are accomplished in this screen.

9.2.8.1 Adding a remote to a program select station

Click on the *Add Comet-4* or *Add Comet Tail* buttons.

9.2.8.2 Adding a Logic I/O

Selecting this option adds one logic input or output. Setup of the PCMCIA input/output is the same as a button on the Comet 4. A logic I/O does not require the discovery of hardware; when live to a box the logic I/O is active.

9.2.8.3 Deleting a remote from a program station

Select that remote by clicking on any button of the remote (the remote will highlight with a blue box), then click the *Delete Remote button*.

9.2.8.4 Deleting a program select station

Click on the *Delete Program Select Station* button; upon confirmation, the currently displayed station will be removed from the system.

9.2.8.5 Choose the type of program select station

1) A **program select station** selects a single audio source at a time.
2) A **program mixer station** selects multiple audio sources and mixes them according to the crosspoint levels for those sources in the page and program level screen.

9.2.8.6 Assigning an input source to a button

Click on the drop list next to the button. A list of input program sources appears. Click on the desired source. Repeat for each button in the station. Move among the system's program stations by clicking the *Next Program Station* and *Previous Program Station* buttons.

9.2.8.7 Naming a remote

Click the name box (initially containing "Click Here to Name"), type in the new name, and click *OK*.

The **status indicator** (above the name) will have one of three labels:
1) **Virtual** – not connected to an MZP matrix, all remotes in PC stand-alone mode
2) **Responding** – connected to an MZP matrix and responding correctly to system messages
3) **Non-responding** – connected to an MZP matrix but not responding correctly to system messages

9.2.8.8 Changing the zone associated with a station

At the lower center of the *Program Select Station* screen the zone associated with the volume control is displayed. To change this zone, double-click on the drop-down arrow and select the desired zone.

9.2.9 The *Program Distribution Stations* item

This screen allows the designer to specify the hardware and programming for each program distribution station in the system. A program distribution station allows the routing of a single audio input to multiple zones.

9.2.9.1 Adding a Logic I/O

Selecting this option adds one logic input or output. Setup of the PCMCIA input/output is the same as a button on the Comet 4. A logic I/O does not require the discovery of hardware; when live to a box the logic I/O is active.

9.2.9.2 Removing a remote

Highlight a remote by clicking on any of its buttons. It highlights (becomes surrounded by a blue box); click the *Delete Remote* button.

9.2.9.3 Moving among stations

Maneuver among the stations using the *Next Station* and *Previous Station* buttons.

9.2.9.4 Audio source

At the lower center of the *Program Distribution Station* screen the audio input source associated with the remotes displayed. To change this zone, double-click on the drop-down arrow and select the desired zone.

9.2.10 The *Paging and Program Levels* screen

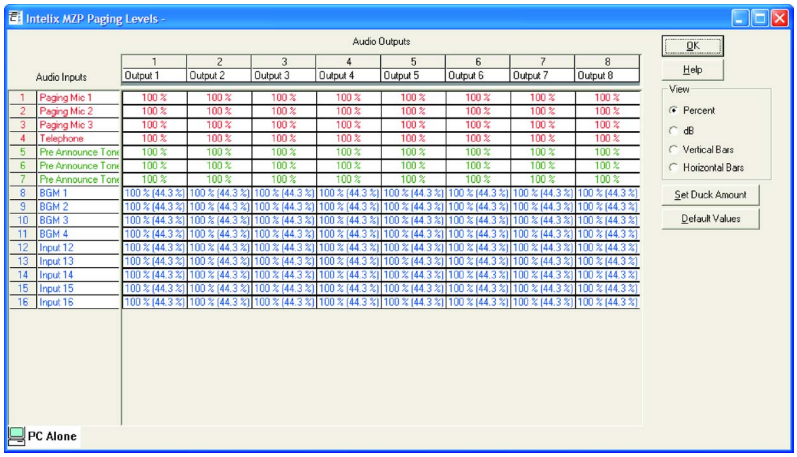


Fig. 9d This screen allows you to set the volume of a page and program level when a page is routed or turned on at a program select station. The crosspoints are represented as a grid of inputs (listed down the left) and outputs (listed across the top). Changing a crosspoint alters the volume of that input to the *specified output only*. These changes are live only when routed.

9.2.10.1 Changing a crosspoint level

1) Doubleclick the crosspoint you wish to alter. A text box appears.
2) Type the desired value. Click *OK*.
3) Repeat for all necessary crosspoints.

9.2.10.2 Setting default values

To set all crosspoints to the full on setting (100% or 0 dB), click the *Default Values* button. After a confirmation, all crosspoints will be set to 100%.

9.2.10.3 Viewing crosspoints

You can view crosspoint settings in percent, dB, vertical bars, or horizontal bars. Select the desired view by selecting an option button in the "view" at the right edge of the screen.

9.2.11 Paging ramp times screen

After the system is assembled, the remotes are programmed, and page and program levels set, there are two items left to adjust before testing: duck amounts and ramp times. MZP implements auto-ducking, pages into a zone automatically duck (reduce) the volume of program material so that the page is more clearly heard. This section explains how to set the parameters associated with ducking: duck amount (how much the program material is reduced during a page), ramp up and ramp down times (the rates at which the program material is ducked), and page ramp times.

There are four parameters associated with ramp times:

1) **Program source duck time**: the amount of time the program material ramps down when a page becomes active.
2) **Program source return time**: the amount of time the program material takes to return to its prepage level after a page.
3) **Page source ramp up**: the amount of time for a page input to reach full paging volume.
4) **Page source ramp down**: the amount of time for a page input to return to zero volume after a page.

As shown in Fig. 9e, the screen allows entry of values for all four parameters. An interactive graph shows the magnitude and relationship among the four parameters. The parameters are limited to values between 0 and 30 seconds.

The *Set Duck Amount* button allows you to change the amount of ducking for each output from this screen. Duck amounts can also be set in the Audio Output screen.

9.2.11.1 Changing the paging ramp time parameters

1) Either click and hold down the up/down arrows on the spin boxes, or make direct text entry into the boxes. If you use the arrow method, you can watch the graph interactively change to the new values.
2) If you wish to alter ducking amounts, click the *duck amount* button and enter the new values in the resulting screen.

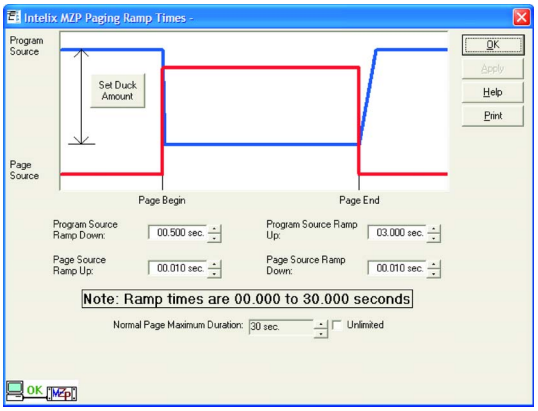


Fig. 9e MZP Paging Ramp Times Screen

The default for page timeout is 30 seconds.

Page timeout means a normal priority page will end after a set amount of time. The Intelix default setting is 30 seconds. If *unlimited* is selected, then a normal priority page will never timeout. Page timeouts are adjustable in increments of 15 seconds.

9.2.11.2 Logic port screen

This screen is for display purposes only. It indicates which logic inputs and outputs are in use as programmed in the other configuration screens, such as the *Paging Stations* screen, Pre-announce Tone trigger, etc.

This screen illustrates the pinnout of the dB25 connector or PCMCIA card.

When live to a box, this screen will change in real-time as the logic port is used.

9.3 The Reports Menu

9.3.1 The *Sales Order* item

This form generates an order for the hardware based on your design. The *Ship To* field is fixed in the PC registry and can be changed, but defaults to the Intelix Order Department. The *Bill To* field is also stored in the registry, so that you need only fill it in once (but change it if needed).

Ship To field defaults to the *Bill To* field data but can be changed on a file basis. Part numbers and quantities are filled in by the MZP software automatically, based on the design in the current file.

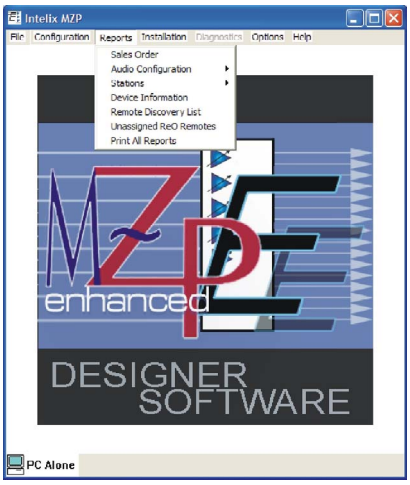


Fig. 9f Reports Menu

9.3.2 The *Audio Configuration* item

This menu sends selected reports to the printer.

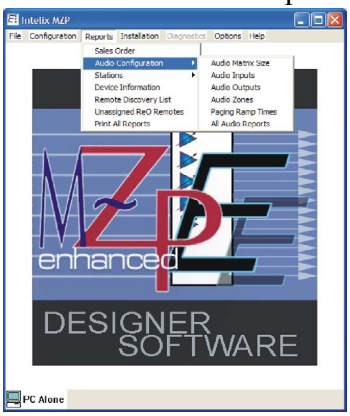


Fig. 9g Audio Configuration Item

a) **All audio parameters item –** prints all audio parameter reports (audio matrix size, audio inputs, audio outputs, and audio zones)
b) **Audio matrix size** – prints the audio matrix size screen
c) **Audio Inputs** – prints the audio inputs screen
d) **Audio Outputs** – prints the audio outputs screen
e) **Audio Zones –** prints the audio zones screen

9.3.3 *Stations* item

This menu send selected screen reports to the printer.

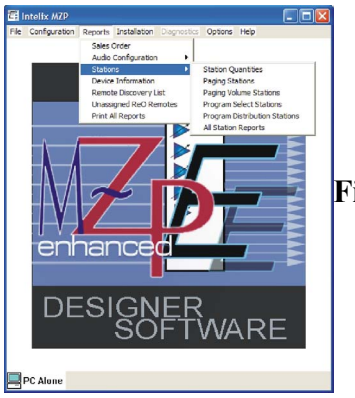


Fig. 9h Stations Item

a) **All audio parameters item –** prints all audio parameter reports (audio matrix size, audio inputs, audio outputs, and audio zones)
b) **Audio matrix size** – prints the audio matrix size screen
c) **Audio Inputs** – prints the audio inputs screen
d) **Audio Outputs** – prints the audio outputs screen
e) **Audio Zones –** prints the audio zones screen

9.3.4 Device information

This option prints crosspoint and mic/line card quantities, as well as software and hardware versions.

9.3.5 Remote discovery list

This item prints a list of all ReO remotes in the system with column and check boxes for use by the installer to sequentially exercise the remotes during the Discovery process.

9.3.6 Unassigned ReO remotes

This item prints a list of ReO remotes which have been discovered by the MZP/Designer Software but have not yet been assigned to a station.

9.3.7 The *Print All Reports* item

After a confirmation message, this item will send all available reports to the local printer. This function is useful for documenting a finished installation.

9.4 The Installation Menu

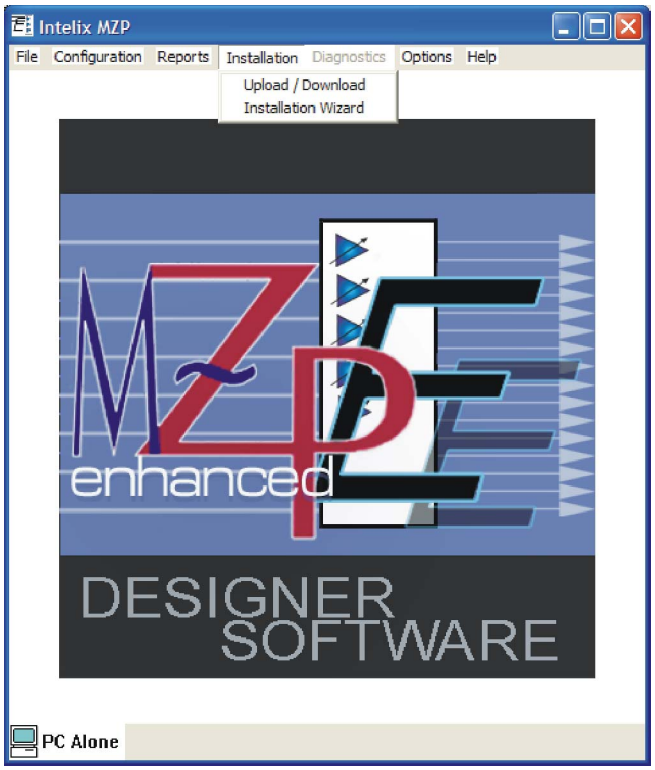


Fig. 9i Installation Menu

9.4.1 Upload/Download

The screen in Fig. 9j appears, allowing reading from the MZP, writing to the MZP, and communications setup.

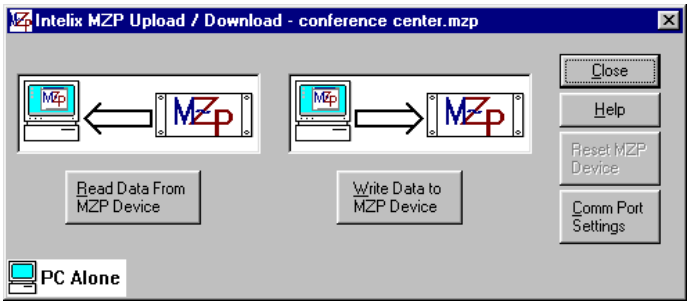


Fig. 9j Upload/Download Screen

9.4.1.1 Read data from an MZP device

This item allows the user to load the currently open file with the data from an MZP hooked up to the PC. For this option to work, the PC must have already established communication with the MZP. After communication is established, the MZP will transfer all its programming to the PC. The data will be stored in whatever file is open when the "MZP device to PC" command is issued. This can be either an existing or new file. A typical use of upload is to modify an existing MZP application. The user would transfer the file to the PC, make the modification, and use "PC to MZP device" to send the new configuration back to the MZP.

9.4.1.2 Write data to an MZP device

This item allows the user to transfer a current file on a PC to an MZP. After establishing communication between the PC and the MZP, the PC will send the currently open file to the MZP, which will store it in its local memory. After transfer, the MZP can be put in discovery mode and configured to run the new program. A typical use of PC to MZP device is to send a new design to the MZP.

9.4.2 Installation Wizard

This option initializes the MZP Designer Software Installation Wizard. For details, please reference page 47.

9.5 The Diagnostics Menu

Fig. 9k The Diagnostics Menu

9.5.1 Device information screen

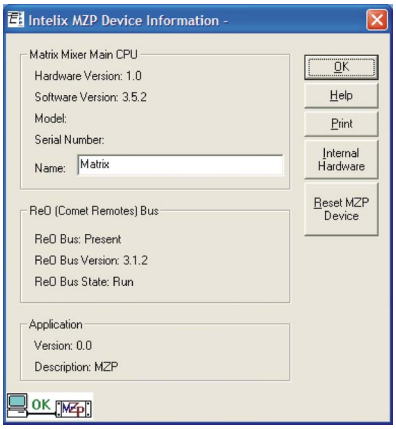


Fig. 9l Device Information Screen

The device information screen (Diagnostics-> Device Information), shown in Fig. 9l, presents information general to the MZP system.

9.5.1.1 The name of the matrix

The matrix name is a text string of up to 32 characters. You can change the name by clicking the name and entering the new name.

9.5.1.2 Device information

Displays the model number, hardware, and software version numbers; not alterable by the user.

9.5.1.3 ReO bus status

Shows the current status (present or absent) of the ReO bus and bus state (run or discovery), as well as version number. If the ReO bus is not present, the "ReO bus version" and "ReO bus State" fields are grayed out.

9.5.1.4 Application software

Any special application software present on the machine will be displayed in the "Special Application" area.

Note: All "E" MZP models have an application version of 4.0 or higher.

9.5.1.5 Memory reset

Pressing the *Reset* button leads to a screen allowing the erasing of the matrix's memory, resetting the MZP device.

9.5.1.6 Internal hardware item

The *hardware configuration* button shows the user what audio crosspoint boards and mic/line cards are present in the system. Each cell represents an 8 x 8 crosspoint card. Non-responding boards are shown in red, while responding boards are shown in green. The window is scrollable to show all areas of the potential 128 x 128 matrix. Doubleclicking any cell brings up a window displaying the status of the board at that location.

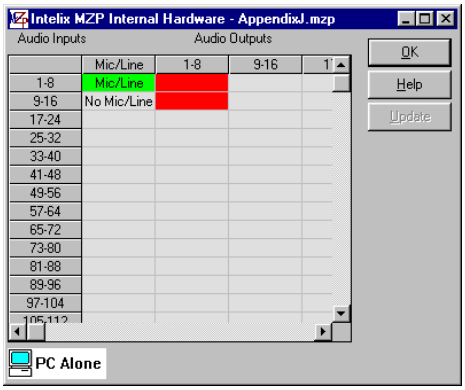


Fig. 9m Internal Hardware Screen

9.5.1.6.1 Crosspoint board status

This window appears when the user doubleclicks a cell in the internal hardware screen. It displays information about the crosspoint board at the address selected.

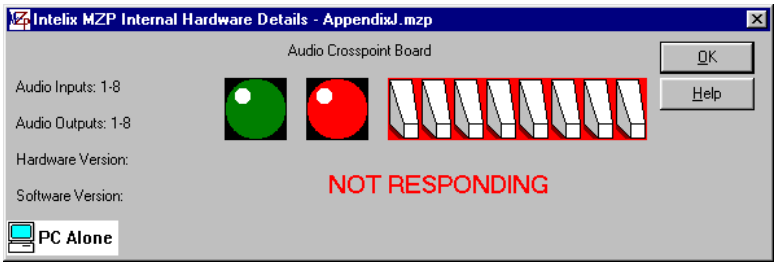


Fig. 9n Crosspoint Board Status Screen

The information on the screen includes the addresses covered by the board, the hardware and software versions of the board (blank if the board is not responding), whether or not the board is responding, and the necessary DIP switch settings for the installation of a board at that address. The addressing DIP switches will appear identical on adjacent cells because a single 16 x 8 board covers two sequential addresses.

Note: This screen appears whether the selected cell actually contains a board or not. If you select a cell that does not have a board, it will say “Not Responding” in red letters. If the board exists and is operating properly, the window will say “Responding” in green letters.

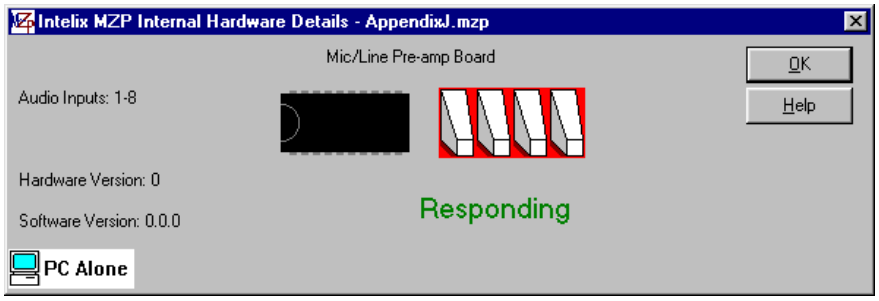


Fig. 9o Internal Hardware Details

9.5.1.6.2 Mic/line status

This screen appears as a response to doubleclicking the mic/line column of the internal hardware screen. It shows input range, hardware, and software versions (blank if board is not responding), whether or not the board is responding, and the necessary DIP switch settings for the installation of a mic/line board at that address.

9.5.2 The *Live Crosspoints* item

This item bring up a screen showing the grid of all existing matrix crosspoints with their current levels displayed. For testing and diagnostic purposes, the levels in the live crosspoint screen can be altered. Changes in this screen take effect immediately.

Using the scrollbars on the matrix, locate the crosspoint you wish to change; doubleclick the crosspoint. A popup allows a new value to be entered. Click *OK*. Changing the level of a member of a stereo pair changes both members.

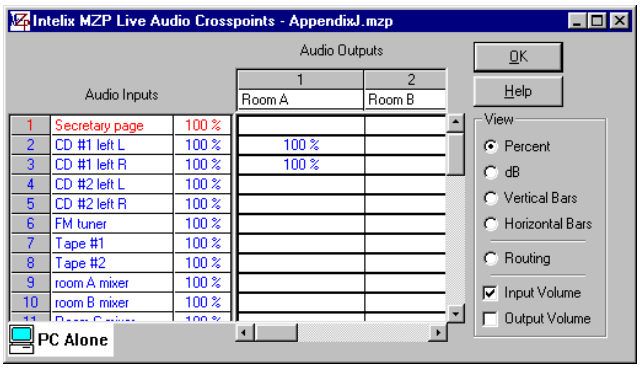


Fig. 9p MZP Live Audio Crosspoints Screen

Views

The view of the crosspoints is selectable among percent (0-100%), dB (-100 dB to 0 dB), vertical and horizontal bar graphs. The "**Routing**" view selection allows you to look at the state of the routing bit for each crosspoint. A crosspoint that is not routed will not be retained after a power cycle. To manually route a crosspoint, change the view to routing and place a check on crosspoint.

The maximum levels allowed at a given input or output are controllable from this screen. The view of these parameters can be turned on and off by checking/unchecking the *Input Volume* and *Output Volume* boxes. These values correspond to the virtual input and virtual output VCAs as explained in section 1. To change these values, make them visible by clicking the appropriate check box, then doubleclick the value to be changed. In the resulting popup, type the new value and click *OK*.

9.5.3 The *Unassigned ReO Remotes* item

This item is used during the installation process for a new system. When a new file is downloaded to a matrix, the actual physical remotes connected to the matrix must be assigned to the virtual station in the file design. The matrix will be put in Discovery mode to enable discovery of the physical remotes. The remotes must then be exercised to be discovered by the matrix. As each remote is discovered by the matrix it will appear on the unassigned remote screen. The remotes will appear in the order they are exercised and be displayed in rows, left to right, top to bottom.

View

There are two ways to view the remotes in the Unassigned Remotes Window:

1) **Full**: This view shows each remote enlarged and allows the exercise of each button and knob on the remotes. When many remotes are present, the screen may be very large in scale.

2) **List**: This view shrinks the size of each remote to an icon size and puts all the remotes into list form. This option eases the problem of many remotes on a small screen. Click and drag the remote's icon to the virtual remotes in the station screens.

When first brought up the unassigned remotes screen will be blank. Click the *Go to Discovery Mode* button. Using your remotes list visit each remote in turn and exercise it by pressing a button or turning a knob. Each remote will appear on the unassigned remotes screen as it is exercised. A name should be assigned to each remote as it appears. The name should indicate the remote's physical location; e.g., "Room A west side".

After all remotes have been recognized, open the paging station screen (Configuration -> ReO paging stations) and the program station screen (Configuration -> ReO program stations) Drag and drop remotes from the unassigned remotes screen to virtual stations on the other two screen to assign them to their appropriate stations.

9.6 The Options Menu

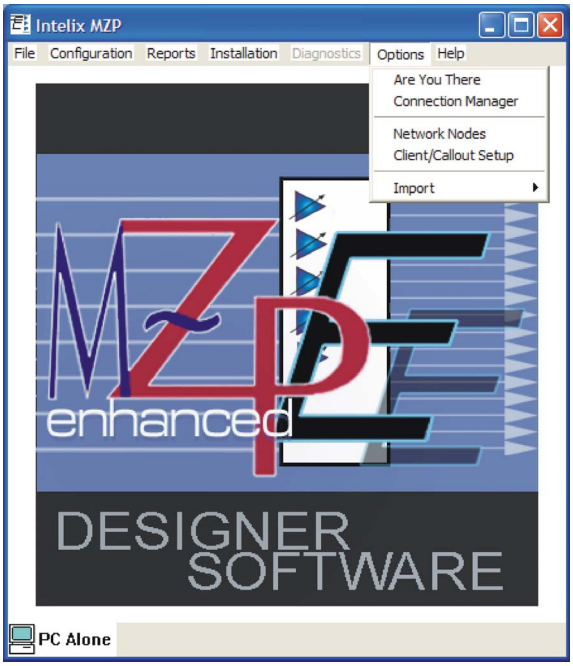


Fig. 9q The Options Menu

Note: Communication Icons
All screens carry a communication icon in the lower left corner. The icon in the lower left corner will indicate the current state of communication. There are three communication icons:

This icon indicates that the PC is not attempting to communicate with an MZP matrix mixer. In this mode you can create new files and design systems for later transfer to an MZP. In PC alone mode some functions may be disabled.

This icon indicates correct communication between the PC and the MZP. You can transfer files, monitor the MARC or make live real time changes in this mode.

This icon indicates a communication failure. Common causes are incorrect communication port selected, incorrect baud rate, or cabling errors.

9.6.1 Are You There

A clock in the MZP software periodically (every three seconds) sends a message (Are You There) to the matrix. This feature allows the software to continually verify the correct communication between the software and the matrix hardware. When the correct Acknowledgment message (I Am Here) is received, the software refreshes the communication OK icon in the lower left of the window. If the I Am Here message is not received, the software assumes a communication failure has occurred and displays the broken link icon.

Normally, the Are You There item should remain active (checked). However when you are doing diagnostic troubleshooting using the Test manager, you may find that the Are You There messages are filling up the communication buffer. In this case, simply uncheck the Are You There item for as long as you use the message buffer, then turn it back on.

9.6.2 Connection manager

The MZP Connection Manager is a grouping of Designer Software functions useful in troubleshooting problems with the matrix hardware software or application. It contains all communication setup control, as well as manual RS232 messaging capability.

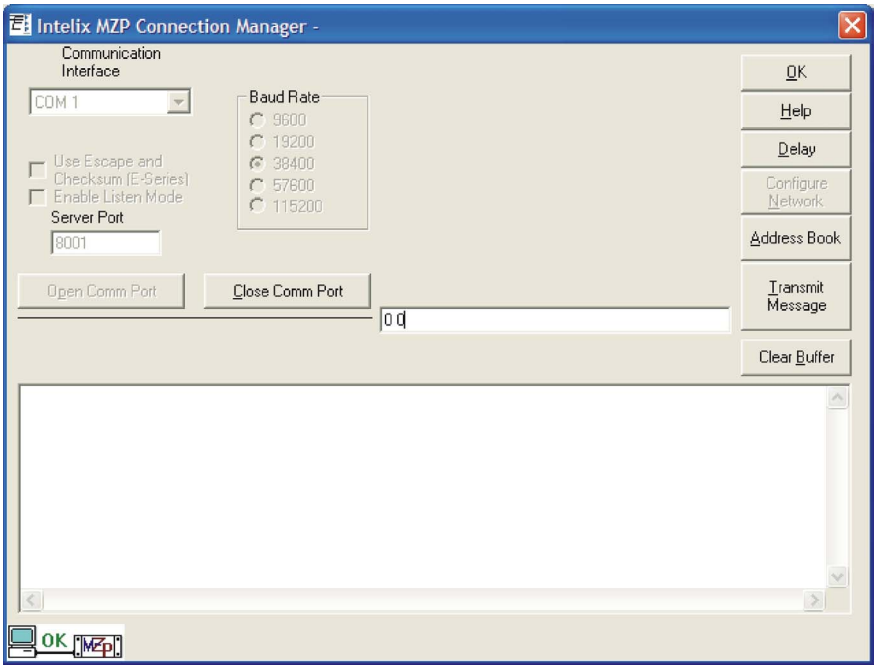


Fig. 9r The Connection Manager

9.6.2.1 Communication interface

The port you select from the communication interface drop-down must be present in your system and unused by any other peripheral in your system. If you choose a nonexistent or in-use port, a warning will appear. IP is enabled here.

9.6.2.2 Use Escape and Checksum

If your controller allows it, using escape and checksum can minimize the error rate over your communication link. If your controller does not allow the use of escape and checksum, uncheck this item.

9.6.2.3 Baud rate

There are five available baud rates: 9600,19200, 38400, 56700, and 115200. Choose whichever rate best suits your system. The rate you choose *must be matched by the DIP switches* on the back of the MZP.

9.6.2.4 Open comm port

This button activates the communication port you have selected. To begin communication with the MZP you must open the port. If your settings selections have been correct, the communication icon in the lower left of the screen will change to OK; if the MZP does not respond the icon will show the broken link.

9.6.2.5 Close comm port

No settings can be altered while the communication port is open. If you need to change any settings to the port, you must first close it. Click the "Close port" button, make the changes and click "Open port". Be sure to recheck the communication icon to ensure that communication is correctly established.

9.6.2.6 The message buffer

The lower part of the RS232 Test Manager comprises the RS232 Message Buffer and its controls. The buffer displays the RS232 messages that are sent and received by the matrix. This function can be extremely useful in creating and debugging applications for the Intelix matrix.

9.6.2.6.1 Clear buffer

The "**Clear Buffer**" button deletes the contents of the RS232 message buffer window. The operation has no effecton the operation of the matrix. Clearing the buffer becomes necessary when the messages of interest are scrolled outside of the window's range.

9.6.2.7 Transmit RS232 message

The "**Transmit RS232 Message**" button causes the Designer Software to transmit the contents of the message window out the currently selected communication port to the matrix. The message window requires the message format shown below.

Message Format:

first number: class number (one decimal number) followed by a space.
second number: message ID: (one decimal number) followed by a space.
third and subsequent numbers: message parameters (one decimal number each) each followed by a space.

Note: All numbers are decimal and must be delineated by spaces. Messages with their classes, IDs and parameters are detailed in this manual.

Shown below is an example of a message typed into the message window ready to send by clicking the **Transmit RS232 Message** button.

This example message represents Class 1, ID 9 Goto I/O Volume. The parameters are i/o flag = 0 (output) i/o number = 2 and new volume = 255. When the **Transmit RS232 Message** button is preset this message will be sent to the matrix.

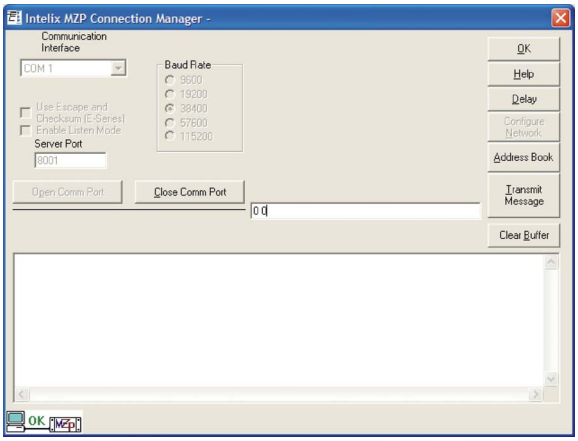


Fig. 9s The Connection Manager

9.6.2.8 Address Book

This options opens an address book containing systems which have been connected to the MZP system. These addresses are cached connections.

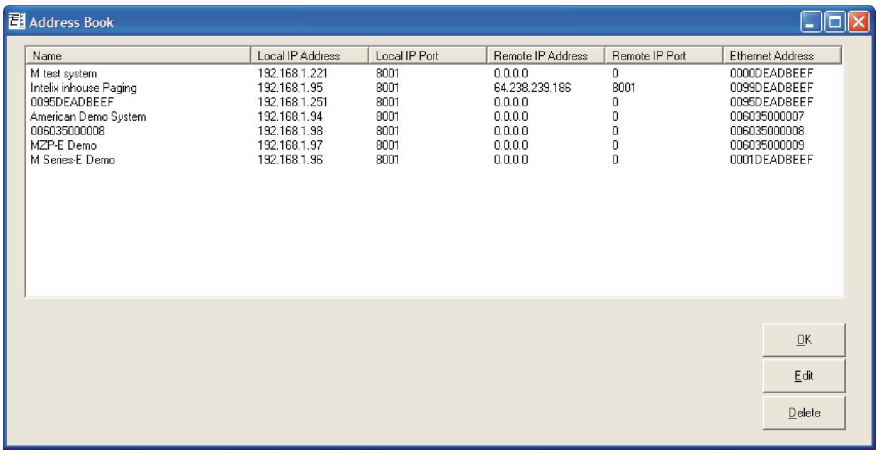


Fig. 9t The Address Book Screen

9.6.2.9 Configure network

This options allows you to configure network settings when connecting to a MZP device. It is best to consult with the local IT personnel before toggling settings on this screen.

Options include: Ethernet address, Name, IP address, Subnet Mask, Default Gateway, and DHCP Server.

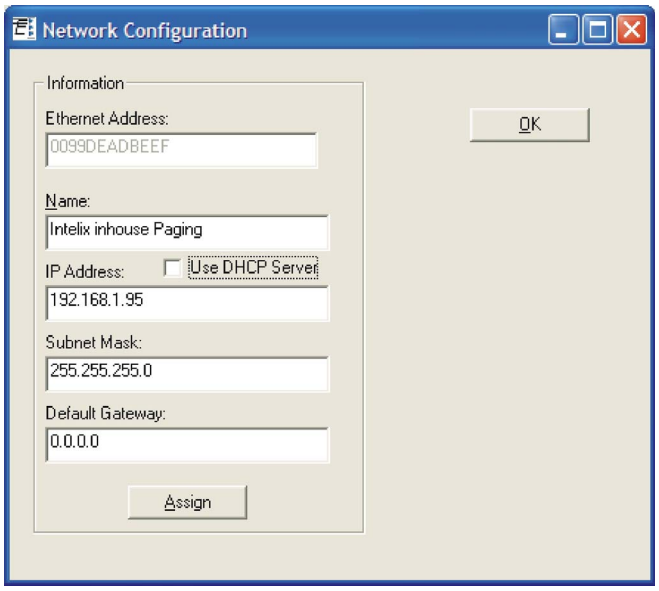


Fig. 9u The Network Configuration Screen

9.6.2.10 When IP is enabled

When IP is enabled in the Connection Manager, several options are present for toggling your IP connection. You can choose a local or remote connection, toggle the IP address and port, as well as select the connection from the Name drop-down.

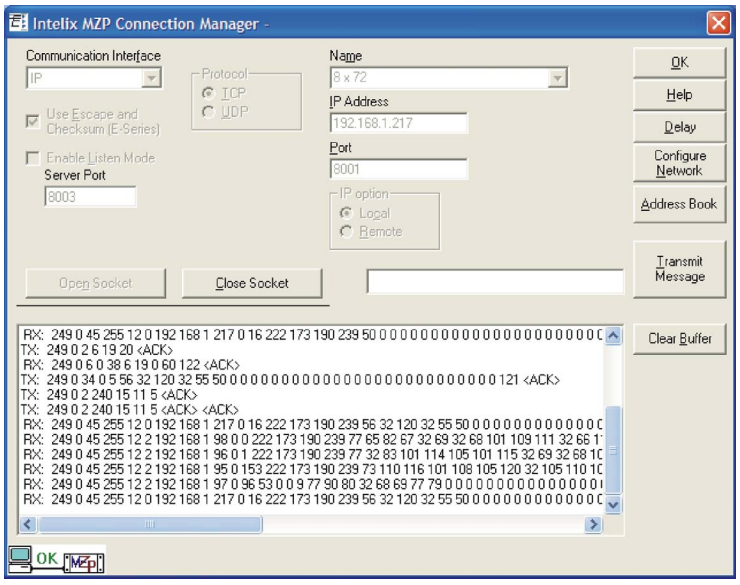


Fig. 9v The Connection Manager with IP enabled

9.6.3 Network nodes

The network nodes option toggles a screen where you can query for Intelix devices on the network. Once queried, these devices are selectable in the Communication Manager.

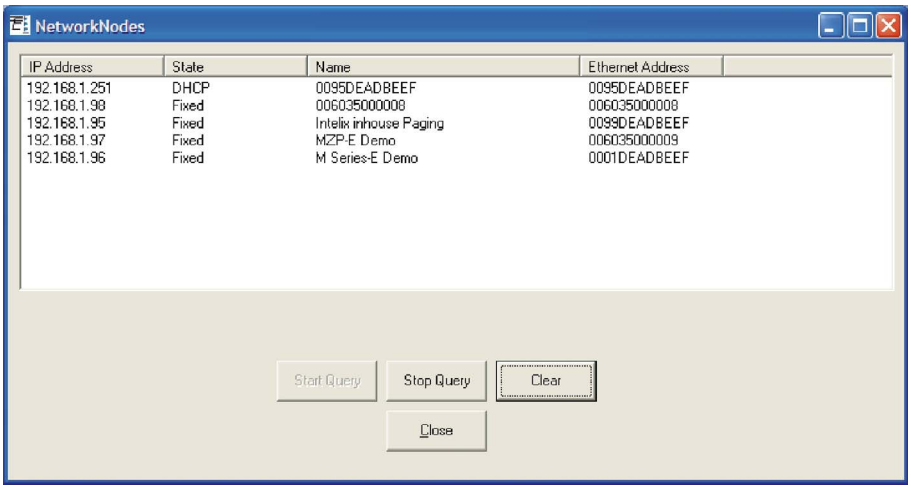


Fig. 9w The Network Nodes Screen

9.6.4 Client/Callout setup

This option establishes a simple firewall by adding IP addresses to the user list. Callout triggers the MZP to act as a server and "call out" to an IP address.

Note: If no addresses are entered into the Authorized Client List, all users will be able to connect. When addresses are entered, only the entered addresses will be able to connect. When entering addresses, **make sure to enter the address you are using first.** Otherwise you will be locked out of the system.

When connecting via the internet, the client's IP address is the internet gateway addresses. Keep in mind that everyone using the same gateway address will have access to the box.

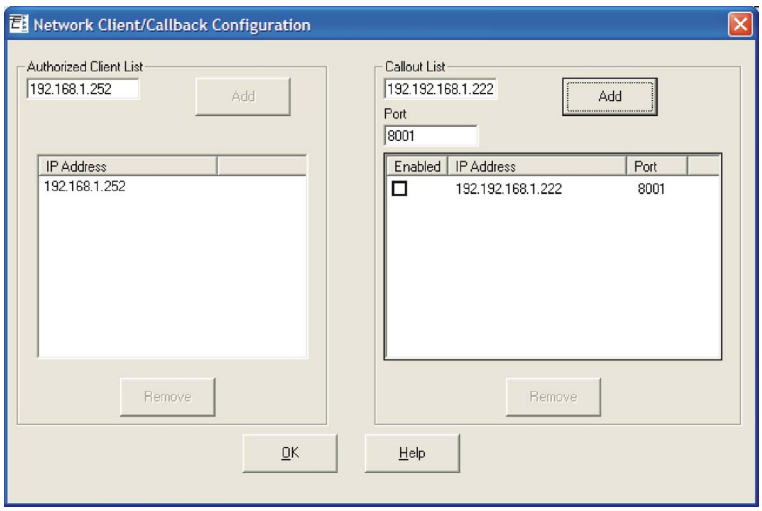


Fig. 9x The Client/Callout Screen

9.6.5 Import

This option allows the importing of address books into the MZP software for IP connectivity.

9.7 The Help Menu

The help menu offers a Table of Contents, an index, and a Find function according to Windows® standard practice.

Appendix A: Power Supplies and Grounding

AC power supply

ReO devices are usually powered by a 12 VAC transformer. The transformer secondary is connected *in parallel* to all the remotes in the system at pins 1 and 3 of their power connections. The ground return for the data signals is provided by pin 1 of the Phoenix connector. The remotes' electronics are grounded to the matrix via the *data* connection ground.

Note: If static is an issue or may be an issue (i.e., if the area if carpeted or in dry conditions), pin 2 of the ground connector must be tied to a facility ground for drainning static away from the electronics.

DC power supply

If the ReO devices are powered by a DC voltage supply, and the DC supply has *floating or isolated outputs*, then the grounding connections to the ReO remotes should be the same as for an AC supply, as described above.

Note: When using a grounded DC supply, the presence of the bridge rectifiers in the remotes will cause there to be a 0.7 V common-mode difference between the DC supply ground and the remote ground. This difference is negligible compared to the common-mode rejection capabilities of the RS485 transceivers.

Matrix AC power connection (external supply versions of the matrix)

The manufacturer supplies an 18 Volt, 3.0 Amp center-tapped transformer to power the mixer. If another AC supply is used instead, it should be of equal voltage and have at least a 60 Volt-Amp rating. The details of the **AC Power Jack** on the rear panel are as shown in Fig. A1.

Matrix DC power connection

The mixer can also be connected to a DC power supply via the Phoenix-style **DC Power Jack** on the rear panel. The DC supply can be used as:

1) the sole power source, or

2) an on-line backup.

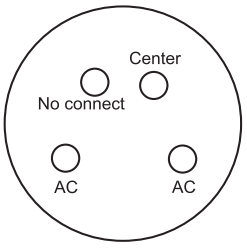


Fig. A1 4-pin DIN Connector, viewed from the rear of the Matrix.

Note: If the DC supply is used as backup, it **must** meet the following voltage requirements:

♦A regulated supply (e.g., battery) must be 18 volts or less (using a voltage of less than 17V will reduce the dynamic range of the mixer when the main supply is off).

♦An unregulated supply (e.g., generator) must be between 17 and 18 volts.

Otherwise, the mixer will draw from the backup supply even when AC power is supplied. The current supplied must not be less than 3.0 A. The wire configuration, voltage, and current requirements are as shown in Fig. A2.

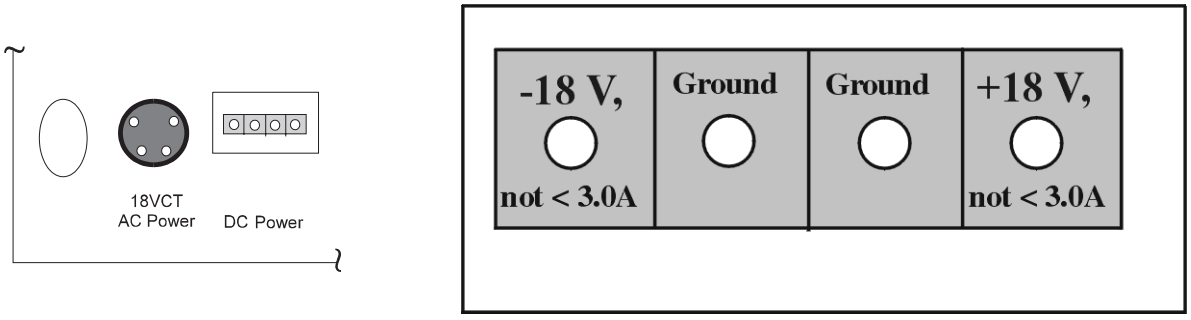
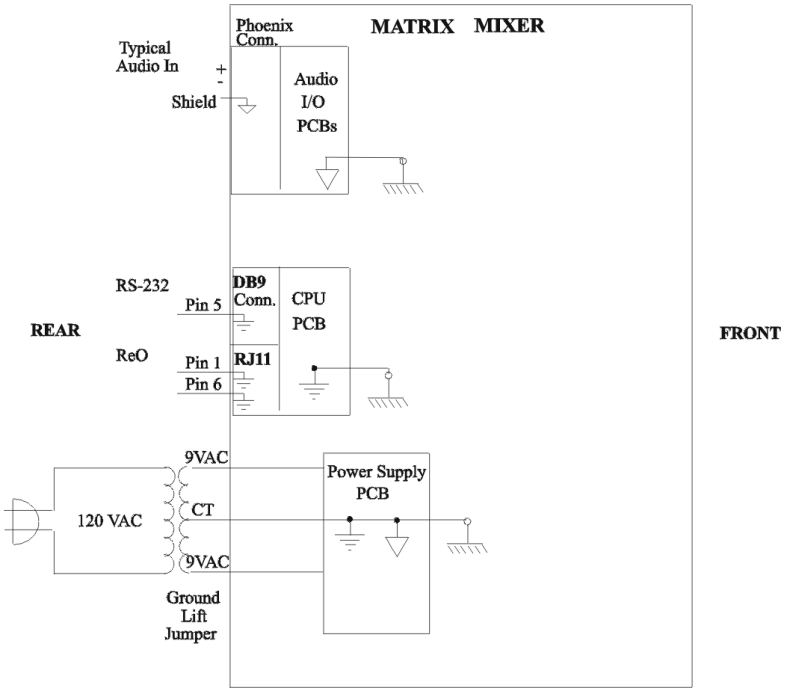


Fig. A2 Rear Panel View

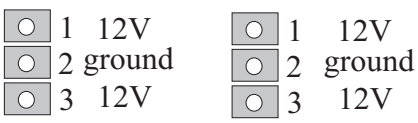
Matrix grounding

The chassis for the matrix provides the main ground for all internal PC boards. There is also a wire ground system to each board to ensure ground connection in the event the chassis is disassembled.

Note: There is *no* connection to the building ground via the AC power supply. Building ground can be supplied through the chassis or shield connections, or through the ground pins on the DC power connector.



ReO power and grounding



This drawing shows the relative positions, within the Comet Tail and the Comet 4, of the three pins of the ReO power connections. **Pin 2** is always grounded, **Pins 1 and 3** are powered (12 V, AC or DC).

Appendix B: Signal-to-Noise Considerations

The MZP matrix audio crosspoints are attenuation only devices. When all the level controls are fully on, there is unity gain through the crosspoints and output cards; and when fully off, there is attenuation of –100dB. To obtain optimum audio performance of the matrix, provide it with input signals of +4dB or greater. Depending on whether the input is balanced or unbalanced, the maximum input level should be no more than approximately +25dB. (When mic/line input cards are used, input gain stages should be set to provide at least +4 dBu to the crosspoint boards.)

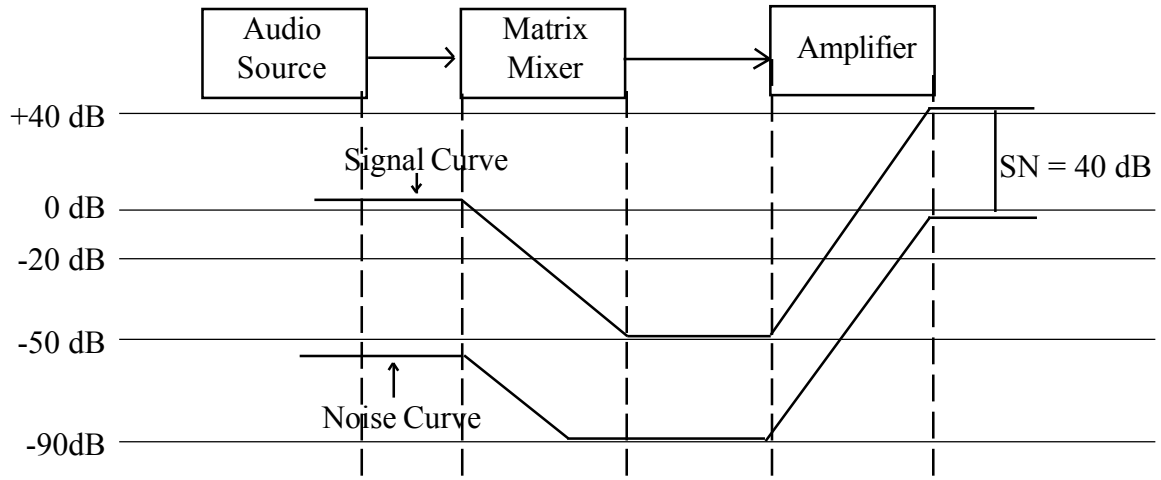
To maximize the signal-to-noise ratio, and to take full advantage of the performance of the matrix, it is important to balance the system levels with most of the gain occurring before the signal enters the crosspoint boards, rather than in the power amplifier afterwards. The matrix has an absolute noise floor of betten than –80 dB. Proper level balancing, using the signal source capability of +26 dB, can result in signal-to-noise ratios of more than 100 dB. Using the power amp to raise signal levels, rather than a pre-matrix amplifier or the matrix itself, diminishes this high level of performance.

The Intelix mic/line input card can be used to boost input signals of less than +4dB to the optimum levels for the matrix.

System balancing

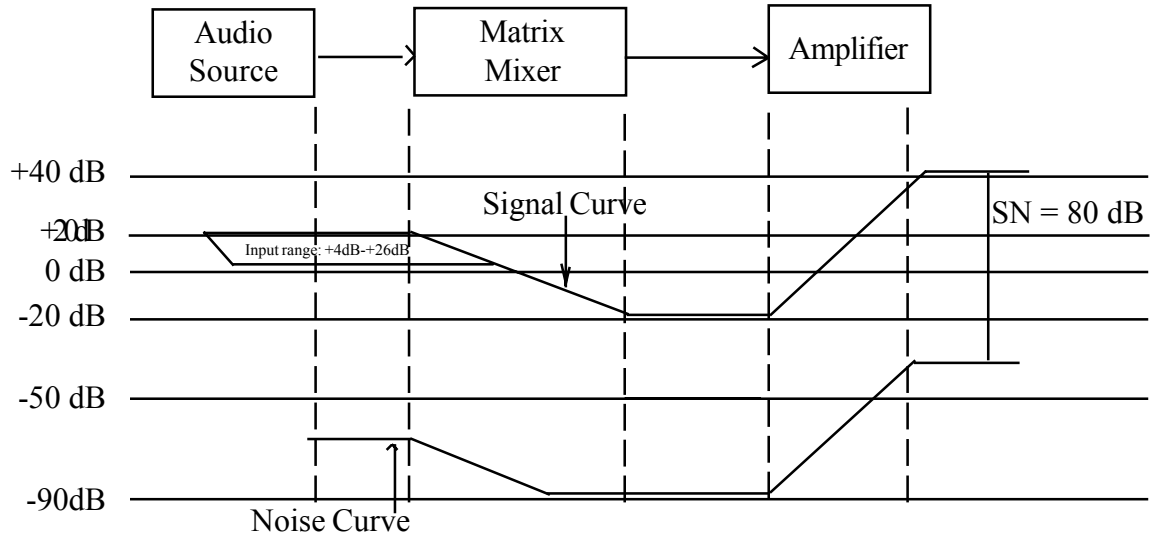
To take full advantage of the matrix's high signal-to-noise performance, take the following steps:

♦ Drive the matrix inputs with a signal of +4dBm to +26dBm or mic/line input card.
♦ Set all matrix VCAs at 225 (linear scale) or 132 (log scale).This is 12dB of attenuation and allows for a signal level increase of 12dB and a decrease of 88dB.
♦ Adjust the post matrix system; i.e., power amplifiers to produce the desired listening levels in the room or zone with this nominal setting of the matrix.



The above drawing shows the signal-to noise performance when the user attenuates a +4dB signal by 50 dB through the matrix. This scenario commonly occurs when the user sets the matrix attenuation controls at the nominal mid-point in an effort to have maximum adjustment range. However, since the control is attenuation only, the nominal midpoint is actually 50dB *of attenuation.* This setting results in the relatively poor signal-to noise ratio seen here.

This drawing shows the result of correctly following the system balancing procedure detailed above. The input signal is in the range of +4dB to +26 dB. With the matrix attenuation controls set to -12dB the input signal is attenuated to -8dB. The resulting signal-to-noise ratio is improved to more than 80dB.



Appendix C: MZP & MZP E Reset Sequence

MZP Reset Sequence

1) Power goes down, reset button is pressed or a software reset command is received.
2) Within a half second the matrix stops passing audio.
3) If power has failed, the matrix memory is switched to battery backup, preserving the current settings.
4) Power returns to normal levels.
5) The matrix begins to restore the current settings of crosspoints across a five second ramp up.
6) After the five second ramp time all crosspoints have been restored to their pre reset levels.
7) The main CPU will accept input commands after a 30 second reboot period.

Note: If during the five second reset ramp the matrix receives an external message from a Comet 4, a Comet Tail, or any RS232 controller, *the external message will override the five second ramp time*. If a full system reboot occurs, including power cycling of all remotes, it may take up to 30 seconds for the remotes to be recognized and fully functional.

Appendix D: Comet Remote Devices

Intelix Comet Series Remotes are single gang control modules for the Intelix MZP system. Typically wall-mounted, Comet remotes function as convenient user interfaces for paging, program source selection, and volume control.

The carefully optimized design allows the Comet remote controls to conveniently interconnect in LAN bus topology. Up to 128 remotes can be utilized with one MZP matrix mixer via ReO bus communication. Each remote's "personality" is then easily assigned using the MZP setup and control software. This "personality" can easily be reassigned as applications change.

Comet Tail

The Comet Tail is a digital remote control device designed for volume control and mute functions. The volume function takes advantage of a rotary encoder, giving the user a knob as the control device. The volume knob is encircled by eight red LEDs to indicate level status. The LEDs move in a clockwise direction with the brightest LED indicating the current level position. The mute function is controlled via a momentary button and corresponding red status LED. The mute function is latching as dictated by software and "LED-on" indicates the mute function is active.

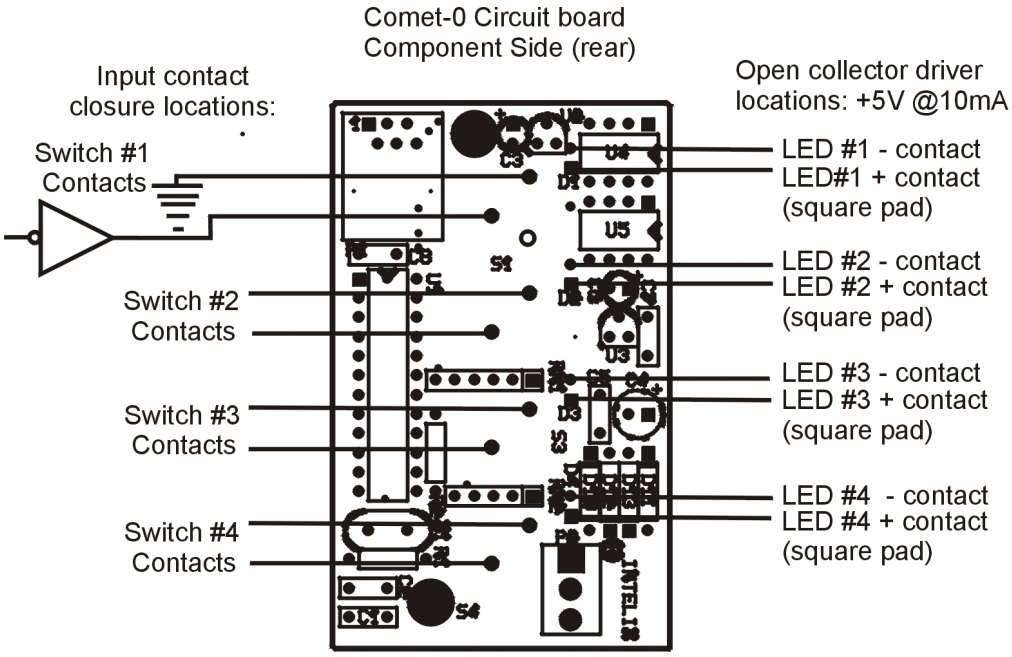
Comet 4

The Comet 4 is a digital remote control device designed for source selection or page routing functions. Each remote has four momentary buttons and four corresponding red status LEDs to indicate when a selection has been activated.

Using the MZP setup and control software, a Comet 4 can be programmed to function as a program selector. In this mode, each of its four buttons enables users to select one of four audio sources for a given zone. Multiple remotes can be used if more than 4 sources are required in a program selection station.

A Comet 4 can also be programmed to function as a paging station. In this mode, each of the four buttons selects the room or zone to which a page will be routed. Multiple remotes can be used if more than four destinations are required. LEDs indicate when a page is successful, or blink to indicate a zone is already being paged into from another location.

Comet 0-I/O



General Description

The Comet 0 I/O is a version of the Intelix Comet-4 remote control module that has no buttons or LEDs. The Comet 0 I/O is a control module for the MZP (Multi-Zone Paging and Program Distribution System) that is used when external contact closures or +5 V logic signals need to be used to trigger the MZP to react to an external device.

The carefully optimized design allows the Comet 0 I/O to conveniently interconnect with standard Comet devices in LAN bus topology. Up to 128 Comet devices can be utilized with one MZP matrix mixer via ReO bus communication. Each Comet can be easily assigned to perform its defined functions using the MZP setup software.

The Comet 0 I/O makes the MZP an ideal choice for zone paging and program routing applications where external devices such as relays, message repeaters, emergency systems, and other devices are capable of producing contact closures or 5V logic signals.

Circuit Board Description

The above printed circuit board drawing shows the necessary contact points for 4 contact closures and their 4 corresponding LED contacts.

Contact closures:
The contact closures can be activated by either a SPST switch or a +5V logic low signal. A logic signal must be active low. 0 Volts activates the contact, whereas +5 Volts is used for an inactive status. A typical logic connection to switch input 1 is shown in the above drawing.

Output drivers:
The 4 output driver contacts can be connected to any 5 VDC devices operated with a current sink capacity of 10 mA or less. The outputs are controlled by the system software, which typically turns an LED on when its switch contacts are active. These signals can be used for external indicators (LEDs or lamps). In standard software the outputs track the state of their respective contacts; that is if switch #1 contacts are active, the LED #1 output will be high.

Engineering Device Description

The Comet0-I/O is a wall mountable, programmable digital remote control devices with unique ID capable of communicating status information via RS485 communications from the Intelix MZP Matrix Mixer. The Comet0-I/O is supplied with the same four hole face plate as all Intelix Comet remotes.

Technical Specifications

Power requirements

9 - 18 Volts (AC or DC); One power supply required per 10 remotes

Current draw

100 mA

Power connector type

3 pin - Phoenix connector; phase tolerant

Recommended power wire

2 conductor stranded, 18 AWG

Max. powerwire length

(18 AWG Belden 8461, West Penn 224)

Number of Remotes	12VDC supply voltage	18VDC supply voltage
1	4000 ft. 1220 m.	12000 ft. 3660 m.
4	1200 ft. 366 m.	3600 ft. 1098 m.
8	600 ft. 183 m.	1800 ft. 549 m.
16	300 ft. 91 m.	900 ft. 275 m.
32	150 ft. 46 m.	450 ft. 137 m.
64	75 ft. 23 m.	225 ft. 68 m.
128	33 ft. 10 m.	112 ft. 34 m.

Data communication

RS485 ReO bus

Data connector

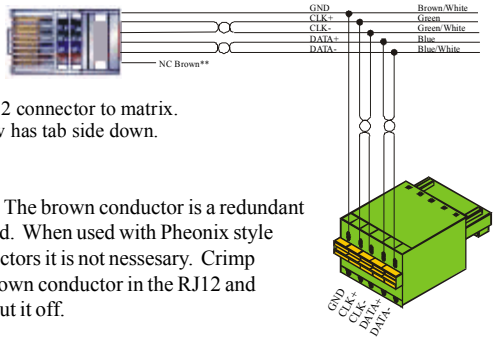
6 pin - RJ12 modular jack or 5 pin Phoenix connector

Supplied Accessories

2 - 6/32' mounting screws1 - female 3 pin IDC power connector

Data connection topology

Phase critical, parallel wiring, twisted pair data and clock.

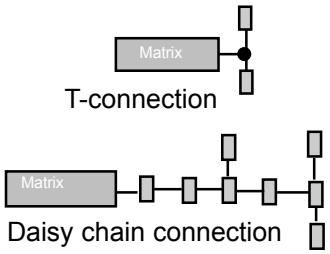


RJ-12 connector to matrix. View has tab side down.

Note: The brown conductor is a redundant ground. When used with Pheonix style connectors it is not nessesary. Crimp the brown conductor in the RJ12 and then cut it off.

Data Connection Topology

T-connections, daisy-chain, and star acceptable



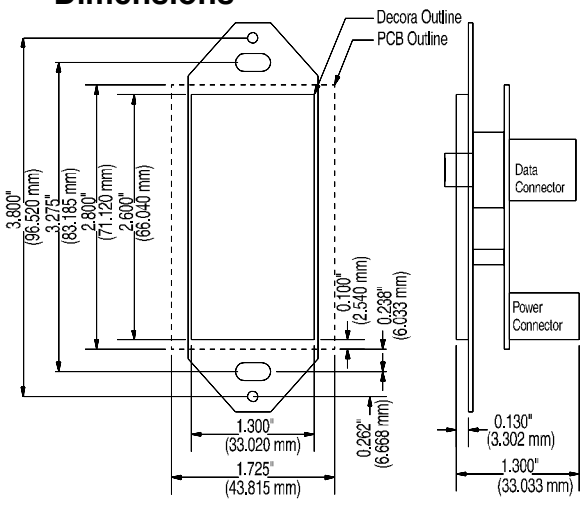
Recommended data wire

Category 3 e.g. Belden 1245A or West Penn WP52995

Maximum data wire length

12000 feet (4000 m)

Dimensions



Appendix E: Troubleshooting the MZP System

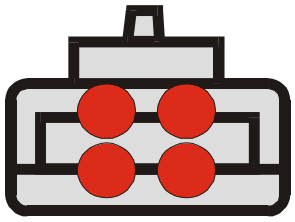
A ReO Comet Test kit is provided with each MZP purchase as a convenience for the Installer/ Commissioning agent. It should remain with the installed system.

The kit consists of:

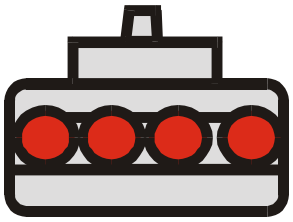
1.) A short ReO bus Patch cable
2.) A 12 VAC power supply (US domestic shipments only)
3.) A cable short/open tester
4.) A cable phase short tester

The patch cable and the power supply are provided for easy testing of individual Comet remote devices independent of the building's ReO bus wiring. To use, insert the patch cable into the ReO bus port of the matrix in place of the installed ReO bus LAN wire. Plug in the supplied power transformer.

To test Comet remotes, first plug in the power connector. A LED on the Comet should start to blink at approximately a one Hz rate. Next, plug in the ReO bus patch cord. The system should recognize the remote, which is viewable in the PC Designer Software



Phase Short Tester



Short/Open Tester

ReO Bus Tester use:

The ReO bus testers are connector sockets with LEDs wired such that they will light when the bus cable is properly wired. The ReO bus must be connected to the matrix and the bus should be in the RUN mode.

Connect either tester in place of a remote to verify proper wiring of the ReO bus. The patch cable can also be used at the recommended central patch bay in the equipment rack as a convenient test point.

One tester will check for opens or shorts to ground for each of the four signal leads. The other will test for shorts between the signal leads. If all LEDs light, there should not be any shorts or opens.

Note: These testers do NOT test for phase crossover problems.

Isolating bad bus leg

When you reach this procedure, you should already have established that some legs (even one) of your system work, but that not all of them do. Take the following steps to isolate the bad leg of your bus system:

1) Plug LED tester into main patch bay.
2) One-at-a-time, unplug legs until bus tester verifies proper operation. The leg that causes the failure is the leg with the wiring problem.
3) Plug-in each leg to verify others are operational.

Troubleshooting a bad bus leg

There are four major causes of a failure in a bus leg. There may be an open in the bus, a short, a wiring error in a cable (a phase error), or, for systems with more than 3000 feet of bus wire, there may be reflection and termination problems. **Note:** The most common cause of bus leg failures is wiring errors in faulty crimps in connecting the remotes to bus wires.

1) Does the bus leg work part way down the leg, then stop working? If so there is probably an open connection in the wiring for that leg. The open will be found between the last working and the first nonworking remote. Locate and repair the open.
2) Look for short:
    a) Disconnect all remotes on the bad leg.
    b) Disconnect the bad leg from the hub. Using an ohm meter (a DVOM) test each wire of the bad leg against all other wires in the connector, and against the conduit in which the bus runs. If there is zero resistance on any test, locate the short and repair it.
3) A bus phase error occurs when a connector is mis-wired. This is most easily found by carefully examining each connector's wiring by color code to ensure that each connector had connected the bus correctly. If any connector is mis-wired, replace it.

No legs working

If no legs work, there are three likely problems: 1) the wiring from the matrix to the hub is defective; 2) the power supply to the remotes is not working; or 3) there is a loop in the LAN layout .

1) Using a known good remote, replace the hub with the remote and test for correct operation. If the remote works properly, the wiring from the matrix to the hub is OK.
2) Using a volt meter (DVM), examine the voltage at the remote's power pins. If the value does not fall within the required range of 9-18 V (either AC or DC) at the furthest remote from the power supply. The power supply is at fault.
3) If no legs work, and the matrix has been verified OK but removing one leg cause the rest to work, then the leg removed has a short. See troubleshooting bad bus leg above.

Slow and/or erratic remote response

If a remote or group of remotes has a slow response time, i.e., a noticeable lag between button presses and response, there are two likely causes: a) noise or reflections on the bus, or b) a programming problem. To narrow the problem, test the remote hardware as explained below. If the response improves, there is a problem with the bus (noise or reflections).

Testing individual remotes
Testing each remote's hardware can be done with built-in MZP functions. The procedure is as follows:

1) In the PC open the station containing the remote to be tested.
2) Open the Unassigned Remoted screen (Installation -> Unassigned remotes).
3) Drag the remote to be tested to the Unassigned Remotes screen and drop it there.
4) Using the mouse double click a solitary LED and watch the response of the LEDs on the physical remote.

Troubleshooting individual remotes — Blink Codes
There is a built in diagnostic tool for troubleshooting remotes: the remote LED blink codes. The blink codes are different blink patterns that signify the internal state of the remote.

No Blink:
A remote that has no LEDs lit is in one of three states.
a) the remote does not have power applied to it.
b) the remote's unique ID chip is loose or missing.
c) the remote is powered, initialized by the matrix, and is operating normally.

Single Blink:
Single blink mode is "power only," meaning the remotes are powered; however, they are not communicating with the MZP. If the software is set to "run mode," the remotes will continue to single blink; once exercised they will stop blinking.

Double Blink:
Double blink mode means the remotes are powered (single blink), as well as "discovery mode" communication with the MZP--i.e., they are now communicating with the MZP. The remotes must be exercised to be recognized by the matrix/software.

Triple Blink:
Triple blink mode typically indicates a problem on the ReO bus; such as a discovered remote loosing data.

Setting and checking audio levels
If the audio level for the selected program source is set too low, it will be inaudible when selected by the remote. The matrix is an attenuation only device, thus the maximum crosspoint setting is unity gain. A quick test is to set the cross point at this maximum value by manually entering the maximum level at the crosspoint under test. Follow these steps:

1) Go to the Audio Crosspoint Screen (Installation -> Live Crosspoints)
2) Doubleclick on the crosspoint to be tested.
3) Enter 100% (if viewing in percent) or 0dB (if viewing in dB).
4) Go to the Remote under test and select the source you have just raised to full gain.

Checking zones

If a remote seems to work well but controls the wrong area in the building, it is likely that a zone is defined incorrectly. To check the definition of a zone, go to the zone screen (Main ->audio zones) This screen shows the definition of each zone (listed down the left of the screen) as a collection of outputs (listed across the top of the screen). Check these definitions against your design documents.

If all definitions seem to be correct, but the remote continues to control an unexpected part of the building it is possible that a preprogrammed remote was installed in the incorrect location. The best way to check this is to examine the label on the remote placed there by the factory programmer or (presumably) by the programming contractor at the time it was programmed.

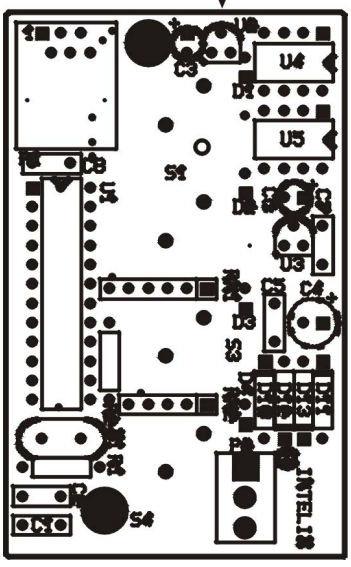
ID chip

Each ReO remote device (Comet4 and Comet Tail) contains a unique ID chip. This socketed 3-pin chip contains the remote's ID number which identifies the remote to the matrix. If this chip is missing or loose, it can cause unusual behavior by the remote.

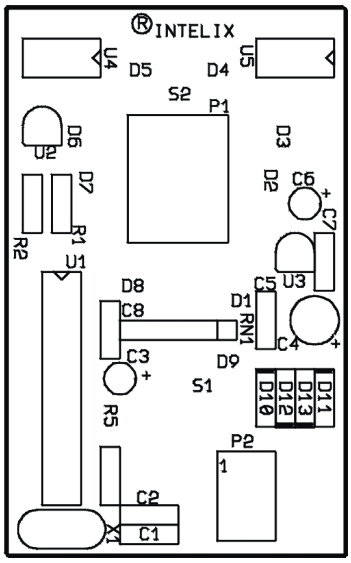
If the remote goes correctly into single blink mode on power up, but then goes to no blink mode *and does not appear on the PC setup screen as recognized,* the remote's ID chip may be missing.

Refer to the drawing below for the location of the unique ID chip, check the remote in question, to make sure that the ID chip is present and well seated in its socket, then repower the remote and test for correct installation.

The Comet 4 circuit board.
The arrow points to U2, the Unique ID chip.



The Comet Tail circuit board.
The arrow points to U2, the Unique ID chip.



Appendix F: Technical information

SPECIFICATIONS

Signal-to noise Ref +26 dBV, 8X8 system	Greater than 100dB
Frequency Response	±.5 dB from 20 Hz to 20 kHz +0, -3 dB from 10 Hz to 30 kHz
Crosstalk	Better than -80 dB
Gain Control Range (attenuation only)	100 dB
Gain Control Resolution	0.4 dB (256 steps)

Inputs

Input Impedance (electronically balanced)	20 kΩ
(unbalanced)	10 kΩ
Nominal Source Impedance	150 Ω
Nominal Input Level	+4 dBV RMS
Maximum Input Level (balanced)	+26 dBV RMS

Outputs

Output Impedance (electronically balanced)	440 Ω
(unbalanced)	220 Ω
Nominal Load Impedance	600 Ω
Nominal Output Level	+ 4 dBV RMS
Maximum Output Level (balanced)	+26 dBV RMS
(unbalanced)	+20 dBV RMS

POWER REQUIREMENTS

8x8 to 16x16	18 VAC center-tapped, 3 A, 54 VA ±18 - 24 VDC, 3 A

DIMENSIONS

Matrix: (Standard models, 2U chassis)	19" x 3.5" x 14" (48.2 cm x 35.6 cm x 8.9 cm)

SHIPPING WEIGHT

Matrix (8 x 8 units, more for other models)	20.3 lb. (9.20 kg)

Servicing

All repair and other service of matrix mixers and remotes should be provided only by qualified service personnel. Contact Intelix for a list of authorized service agents. *Other attempts at service or repair may void the warranty.*

Warranty

All Intelix products are guaranteed against malfunction due to defects in materials or workmanship for two years after date of purchase. If a malfunction does occur during the specified period, the defective product will be repaired/replaced, at Intelix's option, without charge. Furthermore, the "Fresh Start" program ensures that a product which has been repaired/replaced is itself gauranteed for an additional two years.

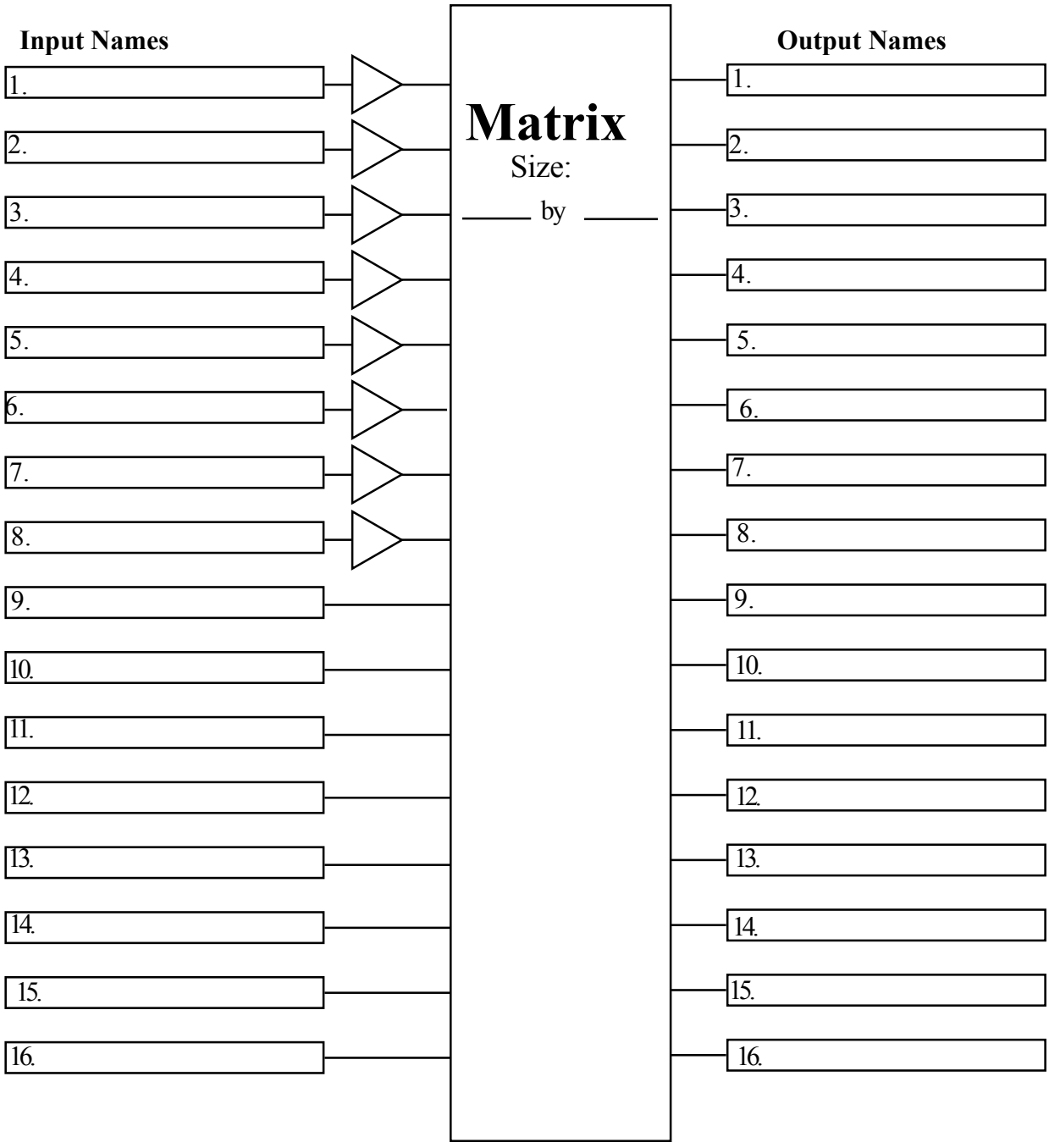
This warranty does not cover: 1) Malfunction resulting from use of the product other than as specified in the user manual; 2) Installation specific wiring; 3) Malfunction resulting from abuse or misuse of the product; 4) Exterior chassis appearance; 5) Malfunction occuring after repairs have been made by anyone other than Intelix or any of its authorized service representatives; 6) Acts of nature; 7) Optional embedded software upgrades or updates.

All repair and service of Intelix products should only be provided by qualified service personnel. Please contact Intelix for a list of authorized service agents. Other attempts at service or repair will void the warranty. Warranty service is only offered after a return authorization number has been generated by an authorized Intelix representative.

MZP Design Templates

The following five pages contain templates to be used in customer application designs.

List all inputs to the matrix down the left, and all outputs from the matrix down the right. **Note:** The matrix is an attenuation only device and expects to see *line-level* inputs greater than 0 dBV. If you have inputs such as microphones or aux level sources (e.g., CD or VCR), you will need to use microphone preamps before the matrix inputs to raise your inputs to line-level.*



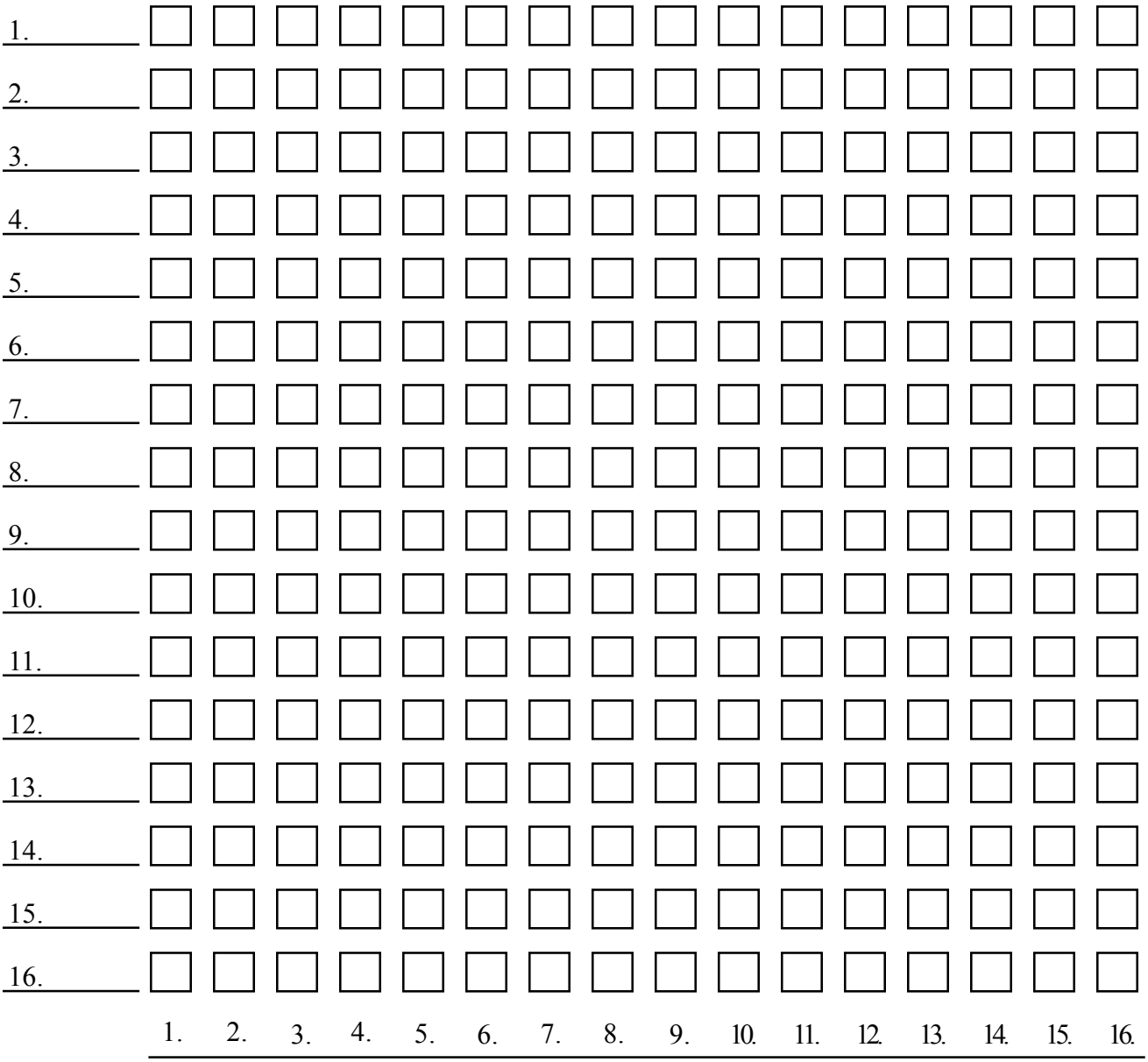
*optional mic/line card

Zone Names	Names of Output(s) in Zone
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.
11.	11.
12.	12.
13.	13.
14.	14.
15.	15.
16.	16.

Crosspoint Level Template

Use this page to enter approximate audio levels for each crosspoint. The number should be between 0 and 255. 0 represents -100 dB attenuation, and 255 represents unity gain.

Input Number

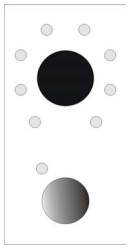
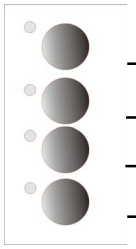
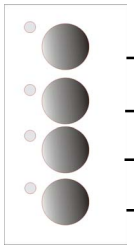
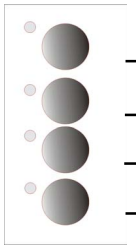


Output Number

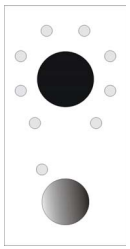
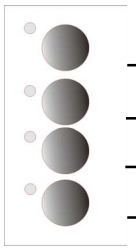
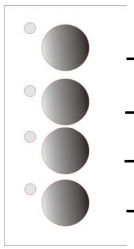
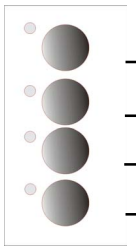
MZP Station creation and assignment

Next to each Comet 4 button, list the selected input or page zone to be assigned.
Draw a square around the remotes to be grouped into one station, and label the station as program select or page.

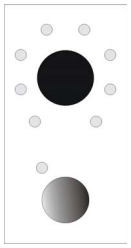
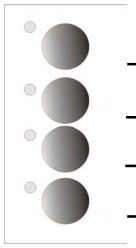
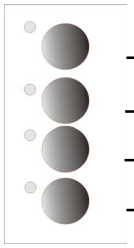
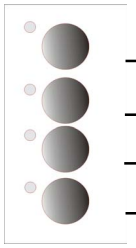
remote label: remote label: remote label: remote label:

remote label: remote label: remote label: remote label:

remote label: remote label: remote label: remote label:

MZP Station creation and assignment

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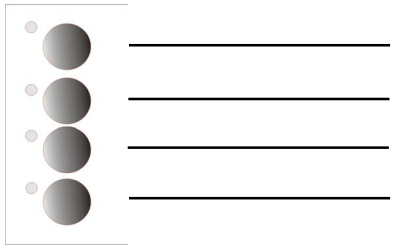
remote label:



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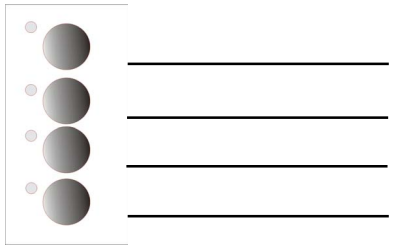

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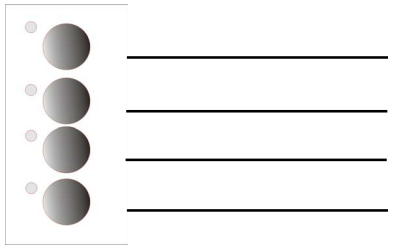

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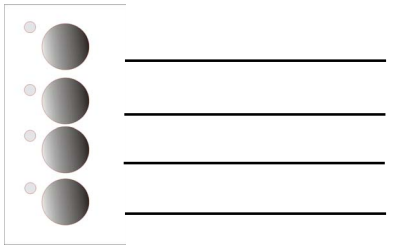

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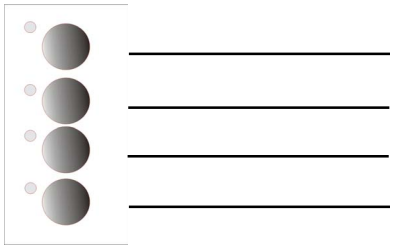

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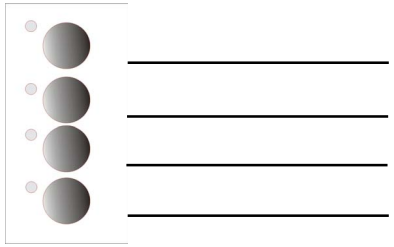

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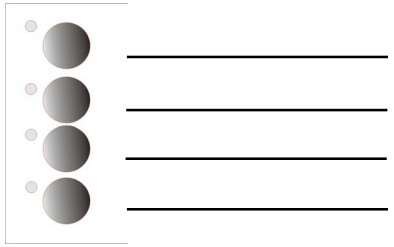

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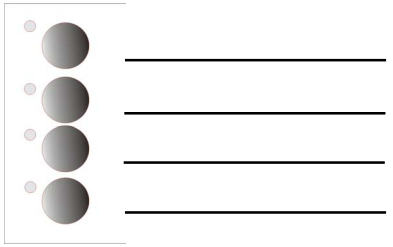

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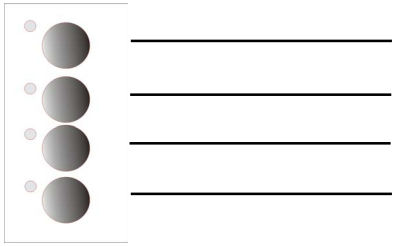

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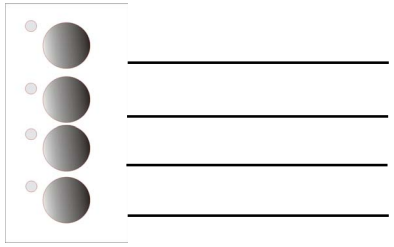

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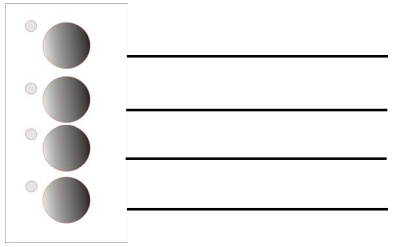

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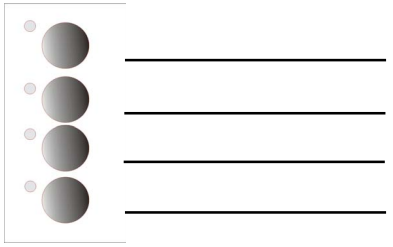

Appendix H: Remote Sequence Template

Sequence	Remote Name	Location	Recognized?	Remarks
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
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